Public Transport Authority

Forrestfield Airport Link

Environmental investigation

May 2014

Executive summary

GHD Pty Ltd (GHD) was commissioned by the Public Transport Authority (PTA) to conduct an environmental investigation for the proposed Forrestfield Airport Link (FAL) and associated infrastructure. The purpose of this investigation was to undertake an assessment of the major environmental constraints in the Study Area. The results and recommendations of this environmental investigation will provide advice on any next steps and environmental approvals which may be required.

This report is subject to, and must be read in conjunction with, the limitations set out in sections 1.4, 3.1.1, 3.4 and the assumptions and qualifications contained throughout the Report.

Key environmental constraints

There were a number of potential environmental and ecological constraints within the Study Area. Given that the Project is still in the planning phase the PTA has the opportunity to review and refine the alignment to avoid, or minimise, impacts to these constraints. These constraints include:

- All vegetation associations and complexes mapped as occurring within the Study Area have less than 30 percent of their pre-European/pre-1750 extents remaining. However, the Study Area may be considered to be within a constrained area of the Swan Coastal Plain (EPA, 2006a). In this case, Beard (1979) vegetation association 1018 and all the Heddle et al. (1980) vegetation complexes are present at greater than 10 percent of their pre-European/pre-1750 extents remaining and would not, therefore, be considered critical assets. Vegetation associations 1001 (in the Cities of Bayswater and Belmont and the Shire of Kalamunda) and 1009 (in the City of Bayswater) are present at less than 10 percent of their pre-European extent remaining, and may, therefore, be considered critical assets.
- Three of the vegetation types identified within the Study Area during the 2013 GHD surveys had affinities with five TECs that have previously been recorded within 5 km of the Study Area. In addition, Mattiske Consulting Pty Ltd (2008) suggested similarities between identified vegetation types within the Perth Airport portion of the Study Area and four TECs. The Morgan (2013) survey of part of the Study Area suggested similarities between identified vegetation units and four TECs.
- A total of 27 individuals of the wavy-leaved smokebush (*Conospermum undulatum*) (listed as Threatened under the WC Act and Vulnerable under the EPBC Act) were recorded within the High Wycombe area during the Level 2 survey.
- Up to 19.5 ha of foraging habitat and 125 potential breeding habitat trees were recorded throughout the Study Area. Potential night roosting and breeding habitat along Poison Gully Creek was also recorded for threatened Black Cockatoo species.
- Up to 19.5 ha of woodland and additional planted shrub habitat (e.g. Victorian tea tree) for the Quenda
- There is habitat suitable for fauna of conservation significance including the Perth-lined Skink (woodland habitat) and the Water Rat (riparian woodland habitat along the Swan River and Poison Gully Creek).
- The Study Area crosses one Bush Forever Site (386) and intersects the corner of another (45 – Poison Gully Creek). The Project should consider avoidance and minimisation to these values during an alignment review and refinement process.

- Ten geomorphic wetlands, including three conservation category wetlands, one EPP Lake, and two wetlands of national significance are within the Study Area. The conservation significant wetlands are located in association with the Swan River and the Perth Airport woodland swamps. The Project requires consideration of these areas in order to avoid or minimise impacts on these wetlands. Indirect impacts, such as impacting on surface water flows or groundwater must also be considered.

Legislation & approvals

There is the potential for two Federally listed Endangered TECs (SCP3a and SCP3c) to occur within the Study Area.

Consultation with DPaW will be required to determine if these areas are considered to be TECs. If DPaW advises that they are considered to be TECs, the Project will likely require referral under the EPBC Act.

A total of 27 individuals of the wavy-leaved smokebush (*Conospermum undulatum*) (listed as Threatened under the WC Act and Vulnerable under the EPBC Act) were recorded within the High Wycombe area during the Level 2 survey. Disturbance to any of these species would likely require referral under the EPBC Act. Although not identified during the field survey, there is the potential for an additional five Federally listed flora species (all State Threatened and Federally Endangered) to occur within the Study Area.

Clearing of the current alignment of the rail corridor could potentially significantly impact one or more of the three species of Black Cockatoo and is likely to trigger the need for referral because it is likely that more than 1 ha of quality foraging habitat would be removed. However this Project is still in the preliminary stages and the full extent of clearing is unknown. Once further information (e.g. preferred alignment, extent of clearing and construction methods) is known, the need to refer and the significance of impacts to these species should be re-considered.

Any clearing of native vegetation requires a clearing permit under Part V of the EP Act, except when a project is assessed under Schedule 6 of the Act or is prescribed by regulation in the *Environmental Protection (Clearing Native Vegetation) Regulations 2004*. The assessment against the Ten Clearing Principles determined that based on the current Study Area the Project is likely to be at variance with Principles a, c, d, e and f and may be at variance with Principles b, g, h and i. However the Project is still in the preliminary stages and the extent of clearing is unknown. Once further information regarding the project is known, including the clearing requirements, the assessment against the clearing principles can be refined.

Recommendations

Details of the Project, such as dimensions of the proposed rail alignment (e.g. width of construction corridor) and the preferred construction method, have not been provided for this assessment. As such, this assessment identifies the potential constraints associated with the current Study Area, but does not discuss the potential impacts in detail.

At this stage of the assessment there are three main recommendations that could be used during the design and planning phase of the Project which would assist in avoiding and minimising potential impacts to the environmental and ecological values identified within this report. These are:

- Placing infrastructure required for the Project within cleared and/or disturbed areas
- Tunnelling the alignment
- Placing the alignment along the midline (median strip) of the Tonkin Highway

It is recommended that an alignment selection and refinement process be undertaken in order to reduce the potential impacts on the environment particularly those environmental values discussed above.

Depending on the outcomes of the alignment selection and refinement process, further environmental investigations may be required at later stages of the Project, including but not limited to:

- An environmental impact assessment – this should include an assessment of the significance of impacts to flora and fauna, and wetlands and also consider other environmental constraints not covered in this ecological assessment.
- For completeness, it is recommended that a Level 1 flora and fauna survey within the inaccessible areas be conducted. The purpose of conducting these surveys would be to ground-truth the findings of the desktop assessment and appropriately determine the environmental values of these areas.
- If there are any remaining impacts on environmental values and the Project continues to be at variance with any of the Ten Clearing Principles, offsets may be required to compensate for those impacts and to achieve a net environmental benefit.
- It is recommended that there is consultation with DPaW regarding the potential TECs that may occur within the Study Area.

An Environment Management Plan (EMP) for the preferred alignment is recommended following the alignment selection and review process. The report provides an outline of the minimum recommendations required for the EMP or similar document. Adherence to these measures would help to minimise the unavoidable impacts to broader environmental and ecological values within the preferred alignment.

Table of contents

Table index

Figure index

Appendices

1. Introduction

1.1 Project background

Growth of aviation services into and from Perth Airport has exceeded previous projections placing stress on the transportation infrastructure that serves the airport. It is predicted that Perth Airport will continue to experience growth in the coming years. The need to address the transportation demands has been recognised by the State and Federal Governments and Perth Airport Pty Ltd (PAPL).

Construction of a rail line connecting Perth city to the airport is an option which the State government is exploring to improve transportation links and cater for the predicted future demand. The Public Transport Authority (PTA) has been requested by the State Government to prepare a Project Definition Plan for the proposed Forrestfield Airport Link (FAL) (formerly known as the Perth Airport Rail Link).

As part of the planning process, the PTA has recognised the requirement to identify environmental constraints associated with potential route options and ancillary infrastructure such as car parks. In 2012, the PTA commissioned GHD Pty Ltd (GHD) to conduct an assessment of environmental constraints for the FAL (GHD, 2013a). Since this study was undertaken, the PTA's understanding of the land requirements for the project has improved. The PTA therefore requires that the Study Area of the initial assessment is broadened to match the current understanding of the Projects land requirements.

GHD was commissioned by the PTA to conduct an environmental investigation of the broader Study Area. The purpose of this investigation is to undertake an assessment of the major environmental constraints in the Study Area. The results and recommendations of this environmental investigation will provide advice on any next steps and environmental approvals which may be required.

1.2 Study Area

For the purpose of this assessment the Study Area commences south of Bayswater station on the existing Perth to Midland railway line and continues along the Tonkin Highway in a south-east direction across the Swan River, then along and parallel to the Great Eastern Highway, where it enters the Perth Airport, just south of Stanton Road. For this section of the Study Area the midline is generally Tonkin Highway and/or Brearley Avenue. The Study Area then passes through Perth Airport, exiting near Maida Vale Road on Dundas Road (Figure 1, Appendix A). The Study Area is located within the Cities of Bayswater and Belmont and the Shire of Kalamunda.

The Study Area gives consideration to the corridor options currently being considered and comprises three main areas:

1. West of Swan River incorporating south of the Perth to Midland rail line (approximately 36.5 ha), and north of the Perth to Midland rail line (approximately 9.3 ha)
2. Swan River to Domestic Terminal (approximately 37.5 ha). This area starts at the Swan River continuing into the Perth Airport land. Perth Airport land is managed by PAPL.
3. High Wycombe (approximately 61 ha) at the eastern extent of the Study Area.

This assessment includes three rail corridor options (Figure 1). For most of their length, the three options share a common or similar alignment. A 60 metre wide buffer either side of each

alignment option was surveyed for the desktop assessment. A brief summary of the three alignment options is provided below:

- Option 1: This option leaves the Midland Line and transitions into an elevated structure to pass over the Guildford Road/Tonkin Hwy interchange. The route then returns to surface level and crosses Dunstone Road on an independent rail bridge. The route continues in an elevated structure over the Swan River and over the Great Eastern Hwy/Tonkin Hwy interchange. The route then enters a cut and cover structure along Brearley Avenue before merging with Option 3 at the western extent of the Airport land.
- Option 2: This option leaves the Midland Line and transitions into a cut and cover structure to go below the Guildford Road/Tonkin Hwy interchange. It then returns to surface level and crosses Dunstone Road and the Swan River on an independent rail bridge. The route then passes under the Great Eastern Hwy/Tonkin Hwy interchange and Tonkin Highway in a cut and cover structure. The route then remains in a cut and cover structure before merging with Option 3 at the western extent of the Airport land.
- Option 3: This option is a bored tunnel for the entire length of the alignment. Tunnel boring will commence at the eastern end of the alignment in High Wycombe and end at the western end of the alignment to the west of the Guildford Road/Tonkin Hwy interchange.

The Swan River has been excluded from this assessment. The values of the Swan River will be discussed as part of this investigation where relevant however the PTA has advised that the Swan River will be subject to separate environmental assessment.

1.3 Scope of works

1.3.1 Previous scope of works

GHD was previously engaged by the PTA to undertake an investigation of environmental constraints during spring 2012 (the original Study Area reported in GHD, 2013a). A summary of the scope of works for this assessment is provided below.

Airport Rail Link environmental constraints assessment, November 2012 (GHD, 2013a)

The assessment included a desktop investigation and a two day flora, vegetation and fauna field survey. The scope of works was to:

- Attend a start-up meeting with the PTA
- Complete a desktop and preliminary assessment
- Conduct a two day Level 1 field survey of the Study Area in spring 2012 to identify flora, vegetation and fauna constraints
- Report on the following components including:
  - Methods, results and appropriate maps of environmental constraints
  - Discussion of the significance of the findings including the requirements under Federal and State environmental legislation
  - Address requirements for clearing permits using an assessment of the 10 clearing principles and propose offset actions where variance is identified
  - Impacts on flora and fauna from the proposed works and provision of management recommendations to address these potential impacts (including hygiene management for dieback and conservation significant flora and fauna species)
- Indicate and discuss requirements for referral to statutory authorities.

1.3.2 Additional scope of works

Following the spring 2012 assessment, the PTA reviewed the Project and expanded the Study Area. GHD was subsequently engaged to undertake an investigation of environmental constraints for the additional areas, including a Level 2 targeted spring flora survey and targeted fauna surveys. This work was undertaken in two stages as presented below.

Environmental Constraints Assessment of the High Wycombe area, August 2013 (GHD, 2013b)

GHD was commissioned by the PTA to conduct a Level 1 flora and fauna assessment for a portion of the proposed FAL and associated station (High Wycombe area). GHD provided a summary of the field assessment findings to the PTA. Methods and results of the investigation for the High Wycombe area are included in this report.

Forrestfield Airport Link environmental investigation (including Level 1 flora and fauna survey, and targeted spring flora and targeted fauna surveys), September 2013

The assessment for this report includes a desktop investigation and a two day Level 1 field flora, vegetation and fauna survey. The field survey incorporated a targeted Level 2 spring flora and vegetation survey and a targeted fauna survey where appropriate for species of conservation significance identified as a result of database searches and previous field investigations (GHD, 2013a, 2013b).

The scope of works was to:

- Conduct a desktop review to determine the environmental attributes of the additional areas and surrounding land including:
  - The presence and identification of Environmentally Sensitive Areas
  - The presence of vegetation community types, including any Threatened or Priority Ecological Communities
  - The presence of protected fauna species which may utilise the Study Area (Appendix B)
  - The presence of protected flora species which may be present within the Study Area (Appendix B)
  - The presence of wetlands
  - The preparation of maps illustrating the location of any significant areas
- Conduct a Level 2 flora and vegetation and fauna survey incorporating a targeted spring flora survey and a targeted fauna survey for species of conservation concern where appropriate. The survey was based on the findings of the desktop review and previous field investigations. The study area for these surveys incorporated the initial Study Area plus the additional study area (including the High Wycombe area) where relevant habitat for species and communities of conservation concern was identified
- Provide advice on environmental approvals requirements
- Provide recommendations on management options and approval requirements
- Prepare an updated draft report for PTA comment. The aim of the updated draft is to collate the findings of the initial investigations (GHD, 2013a) and additional investigations including the recent assessment of the High Wycombe area (GHD, 2013b) and the PTA's comments on the initial draft
- Preparation of a final report incorporating PTA's comments
- Provision of all spatial data in GIS format

This report is a culmination of the environmental assessments of the Study Area conducted to date. GHD has reported the desktop assessment findings for the Study Area. However, was unable to access the entire Study Area for the field investigations. The inaccessible areas were:

- A portion of land within the industrial area (approximately 6 ha), west of the Swan River (north of the railway line). GHD was unable to gain permission to access this area (see Figure 1, Appendix A).
- A portion (approximately 22 ha) of the High Wycombe area. The 22 ha area was the subject of a vegetation assessment (Morgan, 2013) with relevant findings incorporated into this report.
- A portion of the Perth Airport land (approximately 51 ha). However, as the area not surveyed consists of developed land including airport buildings and runway, GHD considers that not accessing this area is not a significant constraint to the scope of this environmental investigation.

Table 1 provides as summary of the types and levels of assessment undertaken for each component of the Study Area.

Details of the Project, such as dimensions of the proposed rail alignment (e.g. width of construction corridor) and the preferred construction method, have not been provided for this assessment. As such, this assessment identifies potential constraints associated with the Study Area, but does not discuss the potential impacts in detail. It is expected the area of disturbance associated with the FAL would be reduced based on refinement of the alignment and reduced footprint as this becomes more defined.

Table 1 Summary of survey methods & timing employed within the Study Area

Method	Study Area component (from west to east)					
	West of Swan River (north of rail line)	**West of Swan River** (south of rail line)	Connecting rail corridor	**Swan River to Domestic Terminal**	Perth Airport (excluding western extent)[i]	**High Wycombe**
Desktop review	✓	✓	✓	✓	✓	✓
Level 1 flora	Partial[ii] (November 2012 and September 2013)	✓ (November 2012 and September 2013)	✓ (November 2012 and September 2013)	✓ November 2012 and September 2013)	×[i]	✓ (August and September 2013)
Level 1 fauna	Partial (November 2012 and September 2013)	✓ (November 2012 and September 2013)	✓ (November 2012 and September 2013)	✓ (November 2012 and September 2013)	×[i]	✓ (August and September 2013)
Level 2 spring flora survey	×[iii]	×[iii]	✓ (September 2013)	✓ (September 2013)	×[i]	✓ (September 2013)
Black Cockatoo habitat assessment	✓ (November 2012 and September 2013)	✓ (November 2012 and September 2013)	✓ (November 2012 and September 2013)	✓ (November 2012 and September 2013)	×[i]	✓ (August and September 2013)
Active searches	×[iii]	×[iii]	×[iii]	✓ (September 2013)	×[i]	✓ (September 2013)

[i] Area not surveyed due to restricted access See Figure 4, Figure 5 and Figure 6 for areas not accessed during survey
[ii] Partial survey due to restricted access. See Figure 4, Figure 5 and Figure 6 for areas not accessed during survey
[iii] Quality and type of habitat does not warrant a Level 2 or targeted survey
Connecting rail corridor – refers to the rail corridor between the Study Area west of the Swan River and the Study Area east of the Swan River to Domestic Terminal.

1.4 Limitations

This report has been prepared by GHD for PTA and may only be used and relied on by PTA for the purpose agreed between GHD and the PTA as set out in section 1.3 of this report.

GHD otherwise disclaims responsibility to any person other than PTA arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by the PTA and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

2. Legislation

The key relevant State (WA) and Federal Environmental Legislation are outlined in Table 2. Further information on relevant legislation, conservation codes and background information are provided in Appendix C.

Table 2 Key relevant environmental Legislation

Legislation		Responsible Government agency	Aspect
State Legislation			
Agricultural and Related Resources Protection Act 1976	ARRP Act	Department of Agriculture and Food (WA)	Weeds and feral animals
Environmental Protection Act 1986 (Part III) (the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 (SCPL))	EP Act	Environmental Protection Authority (EPA)	Swan Coastal Plain Lakes
Environmental Protection Act 1986 (Part IV)	-	EPA	Environmental impact assessment and management
Environmental Protection Act 1986 (Part V)	-	Department of Environmental Regulation (DER) (formerly Department of Environment and Conservation – DEC)	Works Approvals and Licenses for Prescribed Premises
Environmental Protection (Clearing of Native Vegetation) Regulations 2004	-	DER	Clearing of native vegetation
Wildlife Conservation Act 1950	WC Act	Department of Parks and Wildlife (DPaW) (formerly DEC)	Protection of native wildlife
Federal Legislation			
Environment Protection and Biodiversity Conservation Act 1999	EPBC Act	Department of the Environment (DotE) (formerly the Department of Sustainability, Environment, Water, Population and Communities – DSEWPaC)	Matters of National Environmental Significance including listed threatened species, populations and ecological communities, wetlands of national importance, Commonwealth land and migratory species

3. Methods

3.1 Desktop assessment

A desktop review was undertaken prior to the commencement of the field survey to identify potential environmentally sensitive areas within the expanded Study Area and at local and regional scales. This included a review of the following:

- Existing flora and vegetation surveys provided and other relevant reports as available:
  - Vegetation surveys at the Tonkin Highway and Stanton Road intersection (GHD, 2012)
  - Vegetation survey for D.A.2 Structure Plan Area, Milner Road, High Wycombe (Morgan, 2013)
  - Flora and Vegetation at the Perth Airport (Mattiske Consulting Pty Ltd, 2008)
- Bioregion and environmental setting
- Conservation areas and Department of Parks and Wildlife (DPaW) (formerly Department of Environment and Conservation – DEC) reserves
- Environmentally Sensitive Areas (ESA) (including Schedule areas) listed under the Environmental Protection (Clearing of Native Vegetation) Regulation 2004
- Bush Forever Sites
- DPaW Geomorphic Wetlands of the Swan Coastal Plain
- Wetlands of national (EPP Lakes) and regional (International) significance
- Beard (1979) and Heddle et al. (1980) vegetation mapping
- Department of the Environment (DotE) (formerly the Department of Sustainability, Environment, Water, Population and Communities – DSEWPaC), DPaW and Western Australian Museum records of conservation significant flora and vertebrate fauna species (Appendix B)
- Species or communities listed under the EPBC Act (Appendix B)
- Communities listed by DPaW as Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs)

Conservation codes are provided in Appendix C.

3.1.1 Desktop assessment limitations

Desktop investigations use a variety of online resources (such as the Western Australian Museum and DPaW NatureMap database and the EPBC Act Protected Matters database) and the responsibility for the accuracy of such data remains with the issuing authority, not with GHD. The DotE Protected Matters database is used to identify species listed under the EPBC Act. This database draws on various sources to report on the potential of the species occurrence within the area. The DotE search tool is broad-scale in its reporting and often the specific habitat requirements of the species do not occur within the Study Area. For this reason not all species reported by the search tool need to be considered in management decisions. The DPaW NatureMap database reports on actual records of the species within the designated area and can provide more accurate information of the likelihood of species presence.

The desktop assessment did not include a review of databases or other information sources for constraints relating to groundwater, contaminated site, noise, dust, or heritage constraints.

3.2 Flora & vegetation field survey

The flora assessment was consistent with a Level 1 assessment (reconnaissance survey) in accordance with the Environmental Protection Authority (EPA) Guidance Statement No. 51, *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004a). The reconnaissance survey involved a target area visit, with low intensity sampling of the flora and vegetation of the Study Area. A GHD Botanist accompanied by an ecologist conducted a reconnaissance survey of the original Study Area on 29 and 30 November 2012 to:

- Verify the accuracy of the desktop study
- Further delineate and characterise the flora and the range of vegetation units present in the Study Area
- Identify potential impacts

GHD conducted flora and vegetation reconnaissance surveys of the expanded Study Area in spring, 2013. On 17 September, the environmental values of the High Wycombe area were assessed. On 24 September, the environmental values of the Swan River to Domestic Terminal, West of Swan River and High Wycombe areas were assessed. Areas of good quality remnant bushland were assessed in more detail, in accordance with a Level 2 survey (EPA, 2004a) including sampling using eight quadrats and one photo point located in representative vegetation types. During all surveys, the field team conducted targeted searches for conservation significant flora species (Table 3) and vegetation communities (Table 4) considered to potentially occur within the Study Area.

Data recorded during the field surveys is provided in Table 5. Quadrat data and photographs are provided in Appendix D.

Vegetation types were identified by means of a combination of aerial photography interpretation, topographical features, previous mapping (Beard, 1979 and Heddle et al. 1980) and field observations and were compared against Floristic Community Types (FCT) identified by Gibson et al. (1994) as present on the Swan Coastal Plain. The Gibson et al. (1994) "*analysis of plant communities on the Swan Coastal Plain … is the most recent regional floristic work on public lands, …* [and considers] *the patterning of plant distribution on the Plain and relates to the total flora of the Plain*" (Government of Western Australia, 2000). FCT are based on the results of multivariant analysis conducted on 1122 quadrats. Comparison of vegetation against FCT identified by Gibson et al. (1994) can assist in determining the presence of TECs or PECs, although clarification with the DPaW is often recommended for certainty. In addition, FCT cannot be definitively determined when the remaining vegetation has been too disturbed to sample adequately or not enough information about the vegetation can be obtained (Government of Western Australia, 2000).

Species that were well known to the survey botanists were identified in the field, while species that were unknown were collected and assigned a unique number to facilitate tracking. Plant species were identified by the use of local and regional flora keys and by comparison with the named species held at the Western Australian Herbarium. Plant taxonomists considered to be an authority on a particular plant group were consulted, when necessary.

Table 3 Flora species of conservation significance potentially occurring within the Study Area & which were targeted during the surveys

Scientific name	Common name	Status	
		State	Federal
Andersonia gracilis	Slender Andersonia	T	E
Acacia anomala	Grass Wattle	T	V
Banksia mimica	Summer Honeypot	T	E
Banksia pteridifolia subsp. *vernalis*		P3	
Bolboschoenus medianus		P1	
Boronia humifusa		T	
Byblis gigantea	Rainbow Plant	P3	
Caladenia huegelii	Grand Spider Orchid	T	E
Calothamnus accedens		P4	
Calytrix breviseta subsp. *breviseta*		T	E
Carex tereticaulis		P1	
Centrolepis caespitosa		P4	E
Chamelaucium sp. Gingin (N.G.Marchant 6)		T	E
Conospermum undulatum		T	V
Cyathochaeta teretifolia		P3	
Dampiera triloba		P1	
Darwinia apiculata	Scarp Darwinia	T	
Darwinia foetida	Muchea Bell	T	CE
Epiblema grandiflorum var. *cyaneum* [now *Epiblema grandiflorum*]	Babe-in-a-cradle		E
Eryngium subdecumbens		P3	
Eucalyptus balanites	Cadda Road Mallee	T	E
Grevillea curviloba subsp. *incurva*	Narrow curved-leaf Grevillea	T	E
Grevillea thelemanniana subsp. *thelemanniana*	Spider Net Grevillea	P4	
Haemodorum loratum		P3	
Halgania corymbosa		P3	
Hydatella dioica [now *Trithuria occidentalis*]	Swan Hydatella	T	E
Hydrocotyle lemnoides	Aquatic Pennywort	P4	
Hydrocotyle striata		P1	
Hypocalymma sp. Cataby (G.J. Keighery 5151)		P2	
Isopogon drummondii		P3	
Jacksonia sericea	Waldjumi	P4	
Lasiopetalum bracteatum	Helena Velvet Bush	P4	
Lasiopetalum pterocarpum		T	E
Lepidosperma rostratum	Beaked Lepidosperma	T	E
Lepyrodia curvescens		P2	
Macarthuria keigheryi		T	E
Melaleuca viminalis		P2	
Myriophyllum echinatum		P3	
Ornduffia submersa		P4	
Platysace ramosissima		P3	
Schoenus griffinianus		P3	

Scientific name	Common name	Status	
		State	Federal
Schoenus pennisetis		P1	
Senecio gilbertii		P1	
Stylidium longitubum	Jumping Jacks	P3	
Stylidium striatum	Fan-leaved Triggerplant	P4	
Synaphea sp. Fairbridge Farm (D.Papenfus 696)	Selena's Synaphea	T	CE
Templetonia drummondii		P4	
Tetratheca sp. Granite (S. Patrick SP1224)		P3	
Thelymitra magnifica		P1	
Thelymitra manginii K.Dixon & Batty ms. [now *Thelymitra dedmaniarum*]	Cinnamon Sun Orchid	T	E
Thelymitra stellata	Star Sun Orchid	T	
Thysanotus anceps		P3	
Verticordia fimbrilepis subsp. *fimbrilepis*		T	E
Verticordia lindleyi subsp. *lindleyi*		P4	
Villarsia calthifolia [now *Ornduffia calthifolia*]	Mountain Villarsia	T	E

Conservation codes are provided in Appendix C.

Table 4 Threatened Ecological Communities potentially occurring within the Study Area & which were targeted during the surveys

Threatened Ecological Community	Status	
	State	Federal
Banksia attenuata and/or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain (SCP20b)	E	-
Banksia attenuata woodland over species rich dense shrublands (SCP20a)	E	-
Claypans of the Swan Coastal Plain (identified in DSEWPaC, 2013) – relates to SCP07 or SCP09 (Dense shrublands on clay flats).	V	CE
Eucalyptus calophylla [now *Corymbia calophylla*] – *Kingia australis* woodlands on heavy soils, Swan Coastal Plain (SCP3a)	CE	E
Eucalyptus calophylla [now *Corymbia calophylla*] – *Eucalytpus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain (SCP3b) (identified in Morgan, 2013)	V	-
Eucalyptus calophylla [now *Corymbia calophylla*] – *Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain (SCP3c)	CE	E
Herb rich saline shrublands in clay pans (SCP07)	V	CE
Shrublands and woodlands of the eastern side of the Swan Coastal Plain (SCP20c)	CE	E
Southern wet shrublands, Swan Coastal Plain (SCP02)	E	-

Conservation codes are provided in Appendix C.

Table 5 Data recorded during the field survey

Aspect	Measurement
Physical features	Aspect, soil attributes. Percentage surface cover by: rocks, logs and branches, leaf litter, bare ground.
Location of important features	Coordinates recorded in GDA94 datum using a hand-held Global Positioning System (GPS) tool to accuracy approximately ± 5 m.
Vegetation condition	Vegetation condition was assessed using the condition rating scale devised by Keighery (1994).
Disturbance	Level and nature of disturbances (e.g. weed presence, fire — and time since last fire, impacts from grazing, exploration activities).
Flora	List of dominant flora from each structural layer.

3.2.1 Vegetation condition

The vegetation condition of the Study Area was assessed using the vegetation condition rating scale developed by Keighery (1994) that recognises the intactness of vegetation, which is defined by the following:

- Completeness of structural levels
- Extent of weed invasion
- Historical disturbance from tracks and other clearing or dumping
- The potential for natural or assisted regeneration

The scale consists of six rating levels as outlined in Table 6.

Table 6 Vegetation condition rating scale

Vegetation condition rating	Vegetation condition	Description
1	*Pristine or Nearly So*	No obvious signs of disturbance.
2	*Excellent*	Vegetation structure intact, disturbance affecting individual species, and weeds are non-aggressive species.
3	*Very Good*	Vegetation structure altered, obvious signs of disturbance.
4	*Good*	Vegetation structure significantly altered by very obvious signs of multiple disturbances retains basic vegetation structure or ability to regenerate it.
5	*Degraded*	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not in a state approaching good condition without intensive management.
6	*Completely Degraded*	The structure of the vegetation is no longer intact and the area is completely or almost without native species.

(Keighery, 1994)

3.3 Fauna

The type and timing of fauna survey and assessments completed for the various components of the Study Area is summarised in Table 1. Each type of assessment is discussed below.

Nomenclature used in this report follows that used by the Western Australian Museum and DPaW NatureMap database, as it is deemed to contain the most up-to-date species information for Western Australia, with the exception of birds, which uses Christidis and Boles (2008).

3.3.1 Level 1 fauna assessment

The fauna assessment was consistent with a Level 1 assessment (reconnaissance survey) in accordance with Guidance Statement No. 56, *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004b).

A fauna habitat assessment check sheet was used to document the type, condition and extent of habitats within the Study Area:

- Habitat structure (e.g. vegetation type, presence/absence of overstorey, midstorey, understorey, ground cover)
- Presence/absence of refuge including: fallen timber (coarse woody debris), hollow-bearing trees and stags and rocks/boulder piles, and the type and extent of each refuge
- Presence/absence of waterways including type, extent and habitat quality within waterways
- Land use or disturbance history
- Location of habitat within the surrounding landscape and habitat connectivity
- Identification of wildlife corridors within and immediately adjacent Study Area
- Evaluation of the likelihood of occurrence of listed fauna occurring within the habitat (based on presence of suitable habitat)

Opportunistic fauna searches were also conducted across the Study Area. Opportunistic searches involved:

- Searching through microhabitats including turning over logs or rocks, turning over leaf litter and examining tree hollows and hollow logs
- Visual and aural surveys. This accounted for many bird species potentially utilising the study area
- Searching the site for tracks, scats, bones, diggings and feeding areas for both native and feral fauna

3.3.2 Black Cockatoo habitat assessment

An assessment of potential Black Cockatoo habitat within the Study Area was conducted. The survey documented the presence/absence of suitable habitat trees (e.g. including *Eucalyptus marginata* (Jarrah), *E. rudis* (Flooded Gum) and *Corymbia calophylla* (Mari) trees with diameter at breast height (DBH) greater than 50 cm or greater than 30 cm DBH for *Eucalyptus wandoo*). General notes were also taken regarding the presence and extent of foraging habitat and the presence/absence of Black Cockatoo species within the Study Area.

The definition of foraging, breeding and roosting habitat for Black Cockatoos applied in this assessment is based on those definitions provided in DSEWPaC (2012b).

3.3.3 Active reptile searches

Targeted active reptile searches were undertaken for the P3 listed *Lerista lineata* (Perth-lined Skink) in potentially suitable habitats in the Study Area south of the Swan River.

Active searching involved one or two staff searching an area for 10–20 minutes including raking soil and leaf litter, turning over rocks and logs, and splitting fallen timber. Searches were conducted on September 17 2013 in partially overcast to sunny conditions with warm weather following a period of rainfall. A total of 10 active searches were undertaken in potentially suitable habitats within the Perth Airport land and High Wycombe area.

3.4 Field survey limitations

The limitations associated with the field survey are discussed in Table 7.

Table 7 Field survey variables & impact on survey outcome

Variable	Impact on survey outcomes
Experience levels	The survey ecologists are practitioners suitably qualified in their respective fields.
Timing, weather, season.	The initial survey was conducted within the spring flowering period on the 29 and 30 November, 2012, following the winter rainfall period. In the winter rainfall period (June–August) prior to the survey the Perth Airport station (station number 9021) recorded 282.8 mm of rainfall, which is 35 percent lower than the historical mean rainfall for this period (434.1 mm) (Bureau of Meteorology, 2013). The September, 2013 surveys were conducted within the spring flowering period. In the rainfall period (June–August) prior to the survey, the Perth Airport station recorded 302.8 mm of rainfall. This is 30 percent lower than the historical mean rainfall for this period (Bureau of Meteorology, 2013). Some flora species, such as annuals, are only available for collection at certain times of the year and others are only identifiable at certain times (such as when they are flowering). Additionally, climatic and stochastic events (such as fire) may affect the presence of plant species. Species that have a very low abundance in the area are more difficult to locate, due to the above factors. Flora composition changes over time, with flora species having specific growing periods, especially annuals and ephemerals (some plants lasting for a markedly brief time, some only a day or two). Therefore, the results of future botanical surveys in this location may differ from the results of this survey. Complete flora and fauna surveys can require multiple surveys, at different times of year, and over a period of a number of years, to enable observation of all species present.
Intensity of survey	The fauna assessment undertaken was a reconnaissance (Level 1) survey only and thus only sampled those species that can be easily seen, heard or have distinctive signs, such as tracks, scats, diggings etc. Many cryptic and nocturnal species are unlikely to be identified during a reconnaissance survey and seasonal variation within species often requires targeted surveys at a particular time of the year. The fauna assessment was aimed at identifying habitat types and terrestrial vertebrate fauna utilising the Study Area. No sampling for invertebrates or aquatic species occurred. The information available on the identification, distribution and conservation status of invertebrates is generally less extensive than that of vertebrate species.

Variable	Impact on survey outcomes
Determination	The taxonomy and conservation status of the Western Australian flora and fauna is dynamic. This report was prepared with reliance on taxonomy and conservation current at the time issuing, but it should be noted this may change.

4. Environmental context

4.1 Bioregion

The Study Area is located within the Swan Coastal Plain Interim Biogeographic Regionalisation of Australia (IBRA) Region, Perth (Swan Coastal Plain) Sub-Region. "The Swan Coastal Plain is a low lying coastal plain, mainly covered with woodlands. It is dominated by Banksia or Tuart on sandy soils, *Casuarina obesa* on outwash plains, and paperbark in swampy areas. In the east, the plain rises to duricrusted Mesozoic sediments dominated by Jarrah woodland ... Three phases of marine sand dune development provide relief. The outwash plains, once dominated by *C. obesa* – Marri [*Corymbia calophylla*] woodlands and *Melaleuca* shrublands, are extensive only in the south. The Perth subregion is composed of colluvial and aeolian sands, alluvial river flats, coastal limestone, heath and/or Tuart woodlands on limestone, *Banksia* and Jarrah [*Eucalyptus marginata*] – *Banksia* woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvials, and includes a complex series of seasonal wetlands which also includes Rottnest, Carnac and Garden Islands. Rainfall ranges between 600 and 1000 mm annually and the climate is Mediterranean. The subregional area is 1, 333, 901 hectares (ha)" (Mitchell, Williams and Desmond, 2002).

4.2 Conservation areas

A search of NatureMap (DPaW, 2007–) did not identify any DPaW conservation areas within the Study Area.

4.3 Environmentally Sensitive Areas

ESAs are declared by a notice under Section 51B of the EP Act. Table 8 outlines the aspects of areas declared as ESAs (under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* – Reg 6) and provides an assessment of relevance to the Study Area of each aspect (DPaW, 2012a; Government of Western Australia, 2012). The ESAs within the Study Area are mapped in Figure 2 (Appendix A). Five of eleven aspects of ESAs are relevant to the Study Area.

Table 8 Relevance of aspects of Environmentally Sensitive Areas

Aspects of Environmentally Sensitive Areas **relevant** to the Study Area	Aspects of Environmentally Sensitive Areas **not relevant** to the Study Area
A defined wetland and the area within 50 m of the wetland. Wetlands are present in the Study Area corridor and High Wycombe area (see Section 4.5).	A declared World Heritage property as defined in Section 13 of the EPBC Act. Not relevant to the Study Area as there are no World Heritage Sites in the Study Area (DotE, 2012).
The area covered by vegetation within 50 m of rare flora, to the extent to which the vegetation is continuous with the vegetation in which the rare flora is located. Rare (threatened) flora have been previously recorded in the High Wycombe area (see Section 5.5.2).	An area that is registered on the Register of the National Estate (RNE), because of its natural values, under the *Australian Heritage Commission Act 1975* of the Commonwealth. Not relevant to the Study Area as the RNE is no longer in effect.

Aspects of Environmentally Sensitive Areas **relevant** to the Study Area	Aspects of Environmentally Sensitive Areas **not relevant** to the Study Area
The area covered by a TEC. The buffers of four TEC are present in the Study Area corridor and High Wycombe area (see Section 5.4).	The areas covered by the following policies: a. The *Environmental Protection (Gnangara Mound Crown Land) Policy 1992*. Gnangara Mound is present north of Perth. Therefore, this aspect is not relevant to the Study Area. b. The *Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002.* The only wild populations of western swamp tortoises are located at Twin Swamps and Ellen Brook Nature Reserves (on the Swan Coastal Plain within the Perth Metropolitan area), approximately 40 km north of the Study Area. Therefore, this is not relevant to the Study Area.
A Bush Forever Site listed in "Bush Forever" Volumes 1 and 2 (Government of Western Australia, 2000). Bush Forever Sites are within the Study Area corridor and High Wycombe area (see Section 4.4).	Protected wetlands as defined in the *Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998.* This policy area does not include the area defined as the Swan Coastal Plain in Schedule 1 to the SCPL. Therefore, this is not relevant to this Study Area.
Areas of fringing native vegetation in the policy area as defined in the *Environmental Protection (Swan and Canning Rivers) Policy 1997.* This is relevant to the Project as the Study Area corridor and Swan River to Domestic Terminal area intersects the Swan River.	The areas covered by the lakes to which the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (SCPL) (EPP Lakes) applies. No EPP Lakes are present within the Study Area (see Section 4.5.2).

(DPaW, 2012a and Government of Western Australia, 2012)

4.4 Bush Forever

The Bush Forever Strategy is a 10 year strategic plan which formally commenced in 2000 to protect approximately 51,200 ha of regionally significant bushland within approximately 290 Bush Forever Sites. This strategy represents, where achievable, a target of at least 10 percent of each of the original 26 vegetation complexes of the Swan Coastal Plain portion of the Perth Metropolitan Region (Government of Western Australia, 2000).

The Study Area corridor and High Wycombe area intersects two Bush Forever Sites (Figure 2, Appendix A). The details of these Sites are provided in Table 9.

Both Sites are listed has being part of a "regionally significant fragmented bushland/wetland linkage" which is a "regionally significant but not contiguous linkage of bushland/wetland areas" (Government of Western Australia, 2000). These areas are of particular significance as they

provide corridors through otherwise highly cleared lands and provide linkages of regional significance (Government of Western Australia, 2000).

Table 9 Bush Forever Sites within the Study Area

Site number	Site name	Size (ha)	Landscape features	Vegetation and flora	Selection criteria met	Linkages*	Relation to Study Area
45	Poison Gully, High Wycombe	11.6	• Vegetated wetland • Creek • Vegetated upland	• †FCT 3a: *Eucalytpus calophylla* (now *Corymbia calophylla)—Kingia australis* woodlands on heavy soils • Uplands: *E. calophylla* and *E. wandoo* Woodland. *E. calophylla, E. marginata* and *Allocasuarina fraseriana* Open Woodland • Wetlands: *E. calophylla* Open Forest	• Representation of ecological communities • Rarity • General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation	• Adjacent bushland to the south • Part of Greenway 52 • Part of a regionally significant fragmented bushland/wetland linkage	This Bush Forever Site is located in the far east of the Study Area corridor and High Wycombe area, near the intersection of Dundas and Maida Vale Roads.
386	Perth Airport and Adjacent Bushland	629.5	• Open water • Vegetated wetlands • Vegetated uplands	• FCT 4: *Melaleuca preissiana* damplands • FCT 5: Mixed shrub damplands • FCT 7: Herb-rich saline Shrublands in clay pans • †FCT 11: Wet forests and woodlands • FCT 12: *Melaleuca teretifolia* and/or *Astartea aff. fascicularis Shrublands* • †FCT 15: Forests and woodlands of deep seasonal wetlands • FCT 20a: *Banksia attenuata* woodlands over species-rich dense Shrublands • FCT 20b: Eastern *Banksia attenuata* and/or *Eucalyptus marginata* woodlands (most northern occurrence) • FCT 23a: Central *Banksia attenuata – B. menziesii* woodlands	• Representation of ecological communities • Diversity • Rarity • Scientific or evolutionary importance • General criteria for the protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation	• No adjacent bushland • Part of Greenways 26, 99, 109, 110 • Part of a regionally significant fragmented bushland/wetland linkage	This Bush Forever Site is located within the Perth Airport boundary. This Site was not accessed during the field survey and was interpreted using aerial photography. The Study Area crosses this Site. This will sever the ecological linkage of this site. However, the aerial photography shows much of the Site to the south has already been cleared and developed.

FCT Swan Coastal Plain Floristic Community Type (FCT) from Gibson et al. (1994) (Government of Western Australia, 2000)

* Linkages are areas are of particular significance as they provide corridors through otherwise highly cleared lands and provide linkages of regional significance (Government of Western Australia, 2000).

† Not sampled, types inferred

4.5 Wetlands

Many wetlands around the Study Area are considered to be damplands as there is rarely surface water (except for the occasional inundation during winter rains) and the areas are fully vegetated, often with species not associated with wetlands or riparian areas. In contrast, the Swan River is a perennial estuary/water body with the banks often associated with riparian vegetation.

4.5.1 Geomorphic wetlands

Wetlands include not only lakes with open water, but areas of seasonally, intermittently or permanently waterlogged soil. Approximately 25 percent of the Swan Coastal Plain between Moore River and Mandurah is classified as wetland (Hill et al., 1996).

Though extensive in area, not all wetlands retain significant ecological values due to the concentration of urban and agricultural development in the region. Most wetlands have been cleared, filled or developed over, leaving only 20 percent of all the wetlands that were present on the Swan Coastal Plain prior to European settlement. Of these, an estimated 15 percent of the wetland area has retained high ecological values (Hill et al., 1996).

Categorisation of wetlands has been undertaken by Hill et al. (1996), delineating the Swan Coastal Plain into levels of protection and management categories:

- Conservation Category Wetlands are wetlands that support high levels of attributes and functions.
- Resource Enhancement Wetlands are those that have been partly modified but still support substantial functions and attributes.
- Multiple Use Wetlands are classified as those wetlands that have few important ecological attributes and functions remaining.

A proposal that is likely to have a significant impact on a wetland of high conservation significance, such as a conservation category wetland, is considered to be a significant proposal under Section 38 of the EP Act for referral to the EPA.

The Geomorphic Wetlands Swan Coastal Plain dataset displays the location, boundary, geomorphic classification (wetland type) and management category of wetlands on the Swan Coastal Plain.

The Geomorphic Wetlands Swan Coastal Plain dataset identifies 10 geomorphic wetlands within the Study Area boundary (Table 10). The locations of these geomorphic wetlands are presented in Figure 3 (Appendix A).

Table 10 Geomorphic wetlands within the Study Area (west–east)

UFI	Name	Classification/Evaluation	Relation to Study Area
8420	Claughton Reserve	Estuary-Water body/Conservation Category	Small portion (confined to riparian area of river) intersected by Study Area within the West of Swan River area.
8431	-	Sumpland/Multiple Use	Portion of wetland intersected by Study Area north of Guildford Road and within the West of Swan River area.

UFI	Name	Classification/Evaluation	Relation to Study Area
13384	-	Estuary-Peripheral/Multiple Use	Small portion (confined to riparian area of river) intersected by Study Area within the West of Swan River area.
8571	Swan River Estuary	Estuary-Water body/Conservation Category	
13316	Swan River Estuary	Estuary-Water body/Conservation Category	
15264	-	Dampland/Multiple Use	Occurs within Perth Airport portion of Study Area and within the Swan River Domestic Terminal area.
15058	Horrie Miller/Perth Airport	Dampland/Multiple Use	Occurs within Perth Airport portion of Study Area. Further assessment may be required.
15314	-	Palusplain/Multiple Use	Occurs within Perth Airport portion of Study Area. Further assessment may be required.
8823	-	Sumpland/Resource Enhancement	Occurs within Perth Airport portion of Study Area. Further assessment may be required.
13977	-	Palusplain/Resource Enhancement	A portion of this wetland is intersected by the Study Area corridor and High Wycombe area.

(Hill et al., 1996)

A number of the wetlands within the Perth Airport are damplands or palusplain, which rarely (if ever) have standing water, or even waterlogged soil, and which do not support wetland dependent vegetation. The water table has reduced in localised areas as a result of bore water extraction, the construction of a number of deep drains and, possibly, reducing rainfall. As a result of this reduced level, areas that may have previously shown surface water over the winter and spring months and which supported primarily wetland dependent vegetation have also reduced, and the vegetation has been partially replaced by dryland Banksia woodland.

Multiple Use wetlands have no, or extremely limited, amounts of native vegetation remaining, and are generally categorised by pasture grasses or weeds, or other cleared areas. They may retain some hydrological function, but due to lowering groundwater levels, this may also be reduced.

4.5.2 Swan Coastal Plain Lakes

An Environmental Protection Policy (EPP) has been prepared under Part III of the EP Act (the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (SCPL)). The EPP establishes:

- The basis on which the portion of the environment to which the policy relates to is to be protected
- The basis on which pollution of, or environmental harm to, the portion of the environment to which the policy relates to is to be prevented, controlled or abated

This SCPL protects the environmental values of selected wetlands on the Swan Coastal Plain (EPP Lakes). A wetland was gazetted under this EPP if it contained an area of standing water of more than 1000 square metres as at 1 December 1991.

The SCPL prohibits the filling, excavating, mining, discharge or disposal of effluent into and construction or alteration of a drainage system for the drainage into or out of an identified wetland, unless authorised under the Act or under any other written law.

No wetlands protected under the SCPL have been identified in the Study Area (Government of Western Australia, 2012). The nearest EPP Lake is located within the airport land, approximately 40 m north of the Study Area (Figure 3, Appendix A).

4.5.3 Wetlands of national significance

Nationally important wetlands are listed in the *Directory of important wetlands in Australia* (DSEWPaC, 2010). A proposal that is likely to have a significant impact on a wetland of high conservation significance is considered to be a significant proposal under Section 38 of the EP Act for referral to the EPA.

There are two nationally important wetlands within the Study Area boundary (DSEWPaC, 2010) which are described in Table 11 and mapped in Figure 3 (Appendix A):

Table 11 Wetlands of national significance present within the Study Area

Wetland	Wetland type	Description	Relevance to assessment
Perth Airport Woodland Swamps	Inland wetlands	• Seasonal/intermittent freshwater ponds and marshes on inorganic soils; includes sloughs, potholes; seasonally flooded meadows, sedge marshes • Freshwater swamp forest; seasonally flooded forest, wooded swamps; on inorganic soils	Located within the Perth Airport Boundary. The entire alignment crosses this mapped wetland for a length of approximately 400 m. Further assessment may be required.
	Human-made wetland	• Excavations; gravel pits, borrows pits, mining pools	
Swan–Canning Estuary	Marine and coastal zone wetland	• Estuarine waters; permanent waters of estuaries and estuarine systems of deltas • Intertidal mud, sand or salt flats • Intertidal marshes. includes salt-marshes, salt meadows, saltings, raised salt marshes, tidal brackish and freshwater marshes	A small portion of this estuary is located at the intersection of the Study Area with the Swan River.

(DSEWPaC, 2010)

4.5.4 Wetlands of international significance

Wetlands of International Significance are listed under the Ramsar Convention, which is an International treaty that covers the conservation of internationally important wetlands. A search of the EPBC Act Protected Matters Search Tool (DotE, 2012) did not identify any Ramsar-listed sites within 5 km of the Study Area.

4.6 Coastal saltmarsh

The Threatened species Scientific Committee (the Committee) provided its Conservation Advice on the *Subtropical and Temperate Coastal Saltmarsh* to the Minister for the Environment, Heritage and Water (DSEWPaC, 2013b). The Minister accepted the advice of the Committee in 2013 and amended the list of threatened ecological communities under section 184 of the EPBC Act to include this community in the Vulnerable category.

The ecological community is the assemblage of organisms including and associated with coastal subtropical and temperate saltmarsh. There are a number of key diagnostic characteristics for describing the Coastal Saltmarsh ecological community relating to location, occurrence, connectivity, characteristic species, composition of species, proportional cover and patch size (DSEWPaC, 2013b).

The community occurs within a narrow margin of the Australian coastline, within the subtropical and temperate climatic zones south of the South-east Queensland IBRA bioregion boundary at 23° 37' S latitude along the east coast and south of (and including) Shark Bay at 26° S on the west coast (DSEWPaC, 2013b).

This community lies in coastal areas under regular or intermittent tidal influence. In the southern latitudes, saltmarsh is often the main vegetation type in the intertidal zone and often occurs in association with estuaries. The Coastal Saltmarsh community within Perth commonly consists of salt-tolerant vegetation including grasses (e.g. *Sporobolus virginicus*), herbs (e.g. *Carpobrotus modestus*, *Tecticornia* spp.), sedges (e.g. *Baumea juncea*, *Ficinia nodosa*, *Gahnia trifida*, *Isolepis cernua* var. *cernua*), rushes (e.g. *Juncus kraussii*) and shrubs (e.g. *Rhagodia baccata*) (DSEWPaC, 2013b).

Presence of community within the Study Area

Prior to European settlement, the Swan River was mostly brackish, with a tidal amplitude of about one-fifth of that experienced at Perth coastal beaches (approximately 10–90 cm) (Swan River Trust, 2013). Subsequent removal of the Fremantle bar and dredging of the nearby flood delta in the late 1800s resulted in four-fifths of the ocean tide transmitted into the estuary (Swan River Trust, 2013). The Swan and Canning rivers are now a permanently open estuary that changes from fresh/brackish conditions in winter and spring, to salty conditions during summer and autumn (Swan River Trust, 2013).

One species commonly found in coastal marshes (*Ficinia nodosa*) was observed within the Study Area (DSEWPaC, 2013b). However, the presence of this species does not necessarily indicate the presence of the Coastal Saltmarsh ecological community. It is possible that prior to historical dredging, the upper Swan River (within the Study Area) was far enough upstream to be out of significant tidal influence. As a result, the assemblage of species present on the banks of the Swan River within the Study Area may be relatively recent and may not represent the Coastal Saltmarsh community.

Currently Western Australia does not have a state-wide vegetation classification system that identifies saltmarsh outside of a local or regional scale. However, the following major vegetation units generally correspond to the Coastal Saltmarsh ecological community (G. Keighery, pers. comm cited in DSEWPaC, 2013b):

- Samphire shrublands dominated by *Tecticornia* species or *Sarcocornia* saltmarsh complex
- Grasslands dominated by *Sporobolus virginicus*
- Sedgelands dominated by *Bolobschoenus caldwellii* or *Gahnia trifida*
- Rushlands dominated by *Juncus kraussiii*
- Herblands dominated by *Wilsonia humilis*/*W. backhousei* with *Frankenia* spp. and *Triglochin striata* or *Samolus repens*.

None of the above listed vegetation units were recorded within the Study Area along the Swan River.

A key diagnostic characteristic for describing the Coastal Saltmarsh ecological community includes the proportional cover by tree canopy such as Melaleucas or Casuarinas is not greater than 50% (DSEWPaC, 2013b). Remnant *Casuarina obesa* Low Woodland was identified as the vegetation type occurring within the Study Area along both sides of the Swan River. This vegetation type occupies up to 0.74 ha including both sides of the river. A review of the information collected during the survey determined that the proportional cover by trees within this vegetation type is probably greater than 50%.

Furthermore patches of the Coastal Saltmarsh ecological community that are <0.1 ha and occur in isolation (as opposed to part of a mosaic) are excluded from the ecological community (DSEWPaC, 2013b). The relatively continuous canopy of the remnant *Casuarina obesa* Low Woodland on both sides of the Swan River through the Study Area, probably prohibits any area

that may have ground cover species characteristic of the community exceeding 0.1 ha (e.g. areas of approximately 25 m x 40 m). However according to DSEWPaC (2013b), it is not uncommon for the Coastal Saltmarsh ecological community to occur in a mosaic (for example, interspersed with other vegetation or bare sandy or muddy substrate), and thus consist of small patch sizes within that mosaic. Patches of saltmarsh within a mosaic that are within 30 m of each other, and collectively are 0.1 ha or more are considered to be the ecological community (DSEWPaC, 2013b). The relatively continuous canopy of the remnant *Casuarina obesa* Low Woodland probably prohibits connectivity of any patches smaller than 0.1 ha that may have ground cover species characteristic of the community.

During the construction of the Tonkin Highway Bridge (circa 1984) over the Swan River the area was subject to disturbance including surcharging. Surcharging is a ground improvement technique required to reduce long-term total and differential settlements. In this case it involved placing fill (up to 18 m high) in the footprint of the existing bridge hence disturbing the original vegetation. The fill extended to within approximately 30 m of the river bank. The surcharge fill extended below and within the vicinity of the bridge but probably not throughout the entire Study Area.

Considering the above information it is unlikely that the Coastal Saltmarsh ecological community occurs within the Study Area.

5. Vegetation & flora results

5.1 Broad vegetation types

Broadscale vegetation mapping of the area undertaken by Beard (1979) identified the following three vegetation associations within the Study Area (Table 12):

- Medium very sparse woodland; jarrah, with low woodland; *Banksia* & Casuarina (association 1001).
- Medium woodland; marri & river gum (association 1009).
- Mosaic: Medium forest; jarrah–marri/Low woodland; banksia/Low forest; teatree/Low woodland. *Casuarina obesa* (association 1018).

Heddle et al. (1980) mapped the Perth area at a finer scale than Beard (1979). The Heddle et al. (1980) mapping identified three vegetation complexes within the Study Area (Table 13):

- Swan Complex (complex 33).
- Southern River Complex (complex 42).
- Bassendean Complex — central and south (complex 44).

Within the Study Area vegetation has been cleared and modified and not all of the mapped extents of the vegetation complexes are likely to still occur within the Study Area.

5.2 Broad vegetation extent & status

A vegetation type is considered underrepresented if there is less than 30 percent of its original distribution remaining. From a purely biodiversity perspective (not taking into account any other land degradation constraints) there are several key criteria now being applied to vegetation (EPA, 2000):

- The “threshold level” below which species loss appears to accelerate exponentially at an ecosystem level is regarded as being at a level of 30 percent of the pre-European/pre-1750 extent of the vegetation type.
- A level of 10 percent of the original extent is regarded as being a level representing *Endangered*.
- Clearing which would put the threat level into the class below should be avoided.

The EPA Guidance Statement No. 10 (EPA, 2006b) assesses the extent of Heddle et al. (1980) vegetation complexes currently present against predicted pre-European extents (Table 13). According to the EPA Guidance Statement No. 10 (EPA, 2006b), it is important to note that the “*remnant native vegetation mapping used in the Region is derived from dated aerial photography (in this case 1998) with limited ground-truthing. As a consequence the percentages of ecological communities remaining are generally an overestimate of the native vegetation remaining at present and at the date of this Guidance [2006b]. The principal factors contributing to this overestimation are:*

- The preferential mapping of treed landscapes, leading to some mapping of areas that are parkland cleared or completely degraded.
- The inclusion of areas that are approved for clearing through development approvals and/or clearing permits.
- Some areas that have been cleared since the time of the aerial photography.

It is therefore important to bear these constraints in mind when the percentage of the vegetation complexes remaining is approaching 30 percent". Furthermore, as a result of the clearing of the Swan Coastal Plain since 1998, it is likely that the actual percentage remaining of each vegetation type is less.

The local and regional impacts on the loss of vegetation associations have been assessed using the mapped extent of the Beard (1979) vegetation, as adapted by Shepherd et al. (2002) and maintained by DPaW (Government of Western Australia, 2013), and the extent of Heddle (1980) associations remaining (EPA, 2006b). As indicated in Table 12 and Table 13, all vegetation associations and complexes have less than 30 percent of their pre-European/pre-1750 extents remaining. However, the Study Area is considered to lie within a constrained area of the Swan Coastal Plain (EPA, 2006b). In this case, Beard (1979) vegetation association 1018 and all of the Heddle et al. (1980) vegetation complexes are present at greater than 10 percent of their pre-European/pre-1750 extents remaining and would not, therefore, be considered critical assets (EPA, 2006a). Vegetation associations 1001 (in the Cities of Bayswater and Belmont and the Shire of Kalamunda) and 1009 (in the City of Bayswater) are present at less than 10 percent of their pre-European extent remaining, and may, therefore, be considered critical assets at the Local Government Area level.

Table 12 Beard (1979)/Shepherd et al. (2002) vegetation associations, extent & status within the Study Area

Vegetation association		Mapped extent within the Study Area (ha)	Region	Total pre-European extent (ha)	Current extent (ha)	Percent remaining	Percent current extent protected (IUCN I–IV) for conservation (proportion of Pre-European extent)
1001	Medium very sparse woodland; jarrah, with low woodland; Banksia & Casuarina	175	State	57,410.23	14,151.90	24.65	1.14
			IBRA bioregion	57,410.23	14,151.90	24.65	1.14
			IBRA sub-region	57,410.23	14,151.90	24.65	1.14
			City of Bayswater	2666.23	13.78	0.52	-
			City of Belmont	2439.45	152.98	6.27	-
			City of Swan	8868.66	2393.76	26.99	0.02
			Shire of Kalamunda	1473.91	121.10	8.22	1.50
1009	Medium woodland; marri & river gum	46.9	State	18,225.88	2996.62	16.44	0.02
			IBRA bioregion	18,184.82	2974.48	16.36	0.02
			IBRA sub-region	18,183.22	2974.15	16.36	0.02
			City of Bayswater	496.08	39.08	7.88	-
			City of Belmont	301.09	35.37	11.75	-
1018	Mosaic: Medium forest; jarrah–marri/Low woodland; banksia/Low forest; teatree/Low woodland. *Casuarina obesa*	17.8	State	14,059.36	2612.30	18.58	0.73
			IBRA bioregion	14,059.36	2612.30	18.58	0.73
			IBRA sub-region	13,946.31	2587.32	18.55	0.73
			City of Belmont	1198.76	237.66	19.83	-
			Shire of Kalamunda	450.10	54.61	12.13	0.73

(Beard, 1979; Government of Western Australia, 2012, 2013; Shepherd et al., 2002)

Percent remaining greater than 10 percent.

Percent remaining less than 10 percent.

Table 13 Heddle (1980) vegetation complexes, extent & status within the Study Area

Vegetation complex		Landform	Mapped extent within the Study Area (ha)	Total pre-1750 extent (ha)	Present extent (1997/98) (ha)	Percent of each remaining (1997/98)	Percent of each remaining of pre-1750 extent in secure tenure (2002)
					in the System 6/part System 1 area*		
33	Swan Complex: Fringing woodland of *Eucalytpus rudis — Melaleuca rhaphiophylla* with localised occurrence of low open forest of *Casuarina obesa* and *M. cuticularis*.	Pinjarra Plain	25.9	15 783	2 454	15.6	0.0
42	Southern River Complex: Open woodland of *E. calophylla* [now *Corymbia calophylla*] — *E. marginata — Banksia* species with fringing woodland of *E. rudis — M. rhaphiophylla* along creek beds.	Combinations of Bassendean Dunes/Pinjarra Plain/Spearwood Dunes	144	57 979	11 501	19.8	1.5
44	Bassendean Complex — central and south: Vegetation ranges from woodland of *E. marginata — C. fraseriana* [now *Allocasuarina fraseriana*] — *Banksia* spp. to low woodland of *Melaleuca* species, and sedgelands on the moister sites. This area includes the transition of *E. marginata* to *E. todtiana* in the vicinity of Perth.	Bassendean Complex	68.3	87 477	23 624	27.0	0.7

(EPA, 2006b, Government of Western Australia, 2000 and Heddle et al., 1980)

Percent remaining greater than 10 percent.

Percent remaining less than 10 percent.

* System 6 comprises a large proportion of the IBRA Jarrah Forest Bioregion and the central portion of the Swan Coastal Plain Bioregion. System 1 is to the south west of System 6 and covers the southern end of the Swan Coastal Plain Bioregion (south of Bunbury), and parts of the Jarrah Forest and Warren Bioregions. The System 1 boundary follows the southwest System 6 boundary to the Blackwood River and then continues along the Blackwood River to its mouth, at Augusta" (Environmental Protection Authority, 2006b).

5.3 Vegetation type & condition

The majority of the Study Area outside of the Perth Airport boundary has been highly disturbed and includes areas of roadside (alongside Tonkin Highway and Dundas Road), housing and open space. The Study Area crosses the Swan River at Tonkin Highway. The vegetation of the Study Area has been cleared or modified, with areas of revegetation with native and non-native species, particularly along Tonkin Highway. Patches of remnant vegetation were observed at the western boundary of the Perth Airport estate, near Brearley Avenue/Dunreath Drive, and in the east of the Study Area. The over- and midstorey of these areas was mostly intact while the understorey was often dominated by introduced species.

5.3.1 Vegetation type

Previous studies by GHD (2012) identified the vegetation around the Tonkin Highway and Stanton Road intersection as:

- Low Open Woodland of remnant *Eucalyptus* species over disturbed/cleared areas (V10)
- Planted native species (P)

Mattiske Consulting Pty Ltd (2008) mapped the vegetation of the Study Area within the Airport land (inaccessible to the GHD survey team) as:

- Degraded Low Forest to Low Woodland of *Eucalyptus marginata, Banksia attenuata* and *Banksia menziesii* with occasional *Allocasuarina fraseriana* over *Acacia pulchella, Patersonia occidentalis* and *Dasypogon bromeliifolius* (I1) (corresponds with GHD, 2012 V10).
- Degraded Woodland of *Corymbia calophylla, Melaleuca preissiana* and *Banksia* spp. over *Xanthorrhoea preissii, Hypocalymma angustifolium* and *Dasypogon bromeliifolius, Pericalymma ellipticum* var*. ellipticum* and *Astartea scoparia* (J1).
- Pasture Areas (PA).
- Degraded Woodland of *Corymbia calophylla* over *Kingia australis* and *Xanthorrhoea preissii* over low shrubs and herbs (J2).
- Open water with aquatic herbs and emergent sedges and rushes (OW).
- Degraded woodland of *Melaleuca rhaphiophylla, Eucalyptus rudis, Melaleuca preissiana* with occasional *Banksia ilicifolia* over *Lyginia barbata, Xanthorrhoea preissii, Hypocalymma angustifolium, Dasypogon bromeliifolius, Pericalymma ellipticum* var*. ellipticum* and *Astartea scoparia* (K1).
- Low Forest to Low Woodland of *Banksia attenuata, Banksia menziesii* and *Eucalyptus todtiana* over *Hibbertia hypericoides, Alexgeorgea nitens* and *Mesomelaena pseudostygia* (H1).

A total of ten vegetation types were identified during the 2012 and 2013 surveys of the Study Area. These vegetation types align with the vegetation types of the previous surveys in the area. In addition, roads, infrastructure, completely altered areas and open water were identified. The vegetation types are mapped in Figure 4 (Appendix A) and described in Table 14.

Table 14 Vegetation types present in the Study Area

Vegetation type	Vegetation description	Area of Study Area (recorded by GHD) (ha)	Representative photograph
Remnant vegetation	Low Open Woodland of remnant *Eucalyptus marginata* and *Banksia* spp. over a native mid-storey of mixed native species and an understorey of either mixed native species or weedy grasses and herbs.	2.7	
	Remnant *Casuarina obesa* Low Woodland over an understorey of *Juncus* sp. and weedy grasses and herbs.	0.74	

Vegetation type	Vegetation description	Area of Study Area (recorded by GHD) (ha)	Representative photograph
	Remnant *Melaleuca cuticularis* Open Shrubland over an understorey of weedy grasses and herbs.	0.37	
	Remnant *Eucalyptus rudis* Open Woodland over completely altered understorey in drainage lines.	2.6	
	Remnant *Eucalyptus marginata*/*E. rudis*/*Corymbia calophylla* Woodland over a mid-storey and understorey of mixed native species.	3.1	

Vegetation type	Vegetation description	Area of Study Area (recorded by GHD) (ha)	Representative photograph
	Sparse Woodland of *Corymbia calophylla* over *Xanthorrhoea preissii* and low shrubs, sedges and herbs.	2.2	
	Corymbia calophylla, *Melaleuca preissiana* and *Banksia* spp. over *Xanthorrhoea preissii*, *Hypocalymma angustifolium* and *Dasypogon bromeliifolius*, *Pericalymma ellipticum* var. *ellipticum* and *Astartea scoparia*	2.6	
	Scattered *Corymbia calophylla* and/or *Eucalyptus rudis* over a weedy understorey.	12	

Vegetation type	Vegetation description	Area of Study Area (recorded by GHD) (ha)	Representative photograph
Planted vegetation	Plantings of non-native species over an understorey of weedy grasses and herbs.	2.9	
	Areas rehabilitated with native and non-native species following road-works.	29	

5.3.2 Vegetation condition

The vegetation condition of the Study Area identified by GHD ranged from *Excellent* to *Completely Degraded* (Table 15). The majority (153 ha) of the Study Area was *Degraded–Completely Degraded* and *Completely Degraded*. These areas have been cleared in the past and are now dominated by weedy grass and herb species, with the occasional revegetation with native and introduced species. Other anthropogenic disturbances, such as dumping of rubbish and vehicle impacts, were evident across the Study Area.

There are a small number of patches of remnant vegetation (one in the far eastern extent of the Study Area and one at the western boundary of the Perth Airport) which were in better condition. Vegetation within the western boundary of the Perth Airport was in *Good* to *Good–Degraded* condition. Patches of vegetation within the High Wycombe area were in *Excellent* (5.1 ha within the Poison Gully Bush Forever Site and alongside Dundas Road) and *Good* (0.30 ha alongside Dundas Road) condition. These areas had a higher proportion of native species, which had slowed invasion of weedy species.

Vegetation condition mapping of the Study Area is shown at Figure 5 (Appendix A).

Mattiske Consulting Pty Ltd (2008) identified a range in vegetation types within the Perth Airport boundary of the Study Area, from *Excellent* to *Completely Degraded*.

Table 15 Vegetation condition of the Study Area (recorded by GHD, 2013a & during the September 2013 survey)

Vegetation condition	Area (ha)
Excellent	5.1
Very Good–Good	1.7
Good	0.3
Good–Degraded	3.4
Degraded	1.4
Degraded–Completely Degraded	11
Completely Degraded	142
Inaccessible	*53*
Swan River	*1.9*

(GHD, 2013a and the results of the September, 2013 surveys)

Dieback

The site is considered to occur in an area at risk of *Phytophthora cinnamomi* fungal infection, commonly known as Dieback. Dieback is found throughout the southern extent of Western Australia in areas with susceptible plant species that receive rainfall in excess of 400 mm/year (Dieback Working Group, 2010).

There are dieback indicator species present on site, including, *Banksia* species, *Macrozamia riedlei,* and *Xanthorrhoea preissii.* No obvious signs of distress or infection in these indicator species were observed. The majority of the Study Area is considered to be 'uninterpretable', i.e. there is insufficient native vegetation remaining to provide evidence of the presence or absence of the dieback. No specific dieback testing was undertaken and determination of dieback

presence is often difficult as it may not be observed during a visual survey. In the few remaining bushland areas within the Study Area the presence of dieback infection can only be correctly determined through detailed assessment by a highly experienced interpreter and/or with appropriate testing of soil samples.

5.4 Threatened & Priority Ecological Communities

Ecological communities are defined as naturally occurring biological assemblages that occur in a particular type of habitat (English & Blythe, 1997). TECs are ecological communities that have been assessed and assigned to one of four categories related to the status of the threat to the community i.e. *Presumed Totally Destroyed*, *Critically Endangered*, *Endangered* and *Vulnerable*.

The DPaW maintains a list of TECs which have been endorsed by the Minister for the Environment (August 2010). Some of these TECs are protected under the EPBC Act. DPaW-listed ecological communities are given special consideration in environmental impact assessments and have special status under the land clearing regulations of the EP Act. The EPA position on TECs states that proposals which may result in a significant impact on TECs are likely to require formal assessment.

DPaW also maintains a list of PECs. PECs are not listed under any formal Federal or State legislation but are considered by DPaW as important as whole ecosystems (including their processes and communities). *Priorities 1*, *2* and *3* PECs are ecological communities that are adequately known; are rare but not threatened, or meet criteria for *Near Threatened*; PECs that have been recently removed from the threatened list are placed in *Priority 4*. These ecological communities require regular monitoring. *Conservation Dependent* ecological communities are placed in *Priority 5*.

Further information on the conservation codes is provided in Appendix C.

Desktop searches (DSEWPaC, 2012a and DPaW, 2007) did not identify any PECs within 5 km of the Study Area. The buffers of four occurrences of TECs occur within the Study Area and an additional 72 occurrences of TECs occur within 5 km of the Study Area (Table 16) (Appendix D) (mapped in Figure 2, Appendix A). It should be noted that DPaW provides locations for TECs and PECs with a buffer placed typically at a 500 metre (m) radius around the community. As such, the TEC/PEC may not be present within the entire extent of the buffer area.

Three of the vegetation types identified within the Study Area during the 2013 GHD surveys had affinities with five TECs that have previously been recorded within 5 km of the Study Area (Table 16). In addition, Mattiske Consulting Pty Ltd (2008) suggested similarities between identified vegetation types within the Perth Airport boundary and four TECs. The Morgan (2013) survey of part of the Study Area suggested similarities between identified vegetation units and four TECs.

Table 16 Assessment of Threatened Ecological Communities located within 5 km of the Study Area

Threatened Ecological Community (TEC)	Status		Occurrences of DPaW buffers		Assessment of vegetation within the Study Area		
	State	Federal	Within Study Area	Additional within 5 km of Study Area	GHD	Mattiske Consulting Pty Ltd (2008)	Morgan (2013)
Eucalyptus calophylla [now *Corymbia calophylla*] – *Kingia australis* woodlands on heavy soils, Swan Coastal Plain (SCP3a)	Critically Endangered	Endangered	1	7	The following two vegetation types may align with these TECs: • "Remnant *Eucalyptus marginata*/*E. rudis*/*Corymbia calophylla* Woodland over a mid-storey and understorey of mixed native species". Approximately 3.1 ha of this vegetation type was recorded within the High Wycombe area. • "Sparse Woodland of *Corymbia calophylla* over *Xanthorrhoea preissii* and low shrubs, sedges and herbs". Approximately 2.2 ha of this vegetation type was recorded within the High Wycombe area.	Community J2 shared some similarities with this TEC.	The following vegetation unit may align with this TEC: • *Corymbia calophylla* (Marri) open woodland (regrowth) over *Verticordia densiflora* var. *densiflora* low open heath over *Caustis dioica*, *Hypolaena exsulca* very open sedgeland/herbland.
Eucalyptus calophylla [now *Corymbia calophylla*] – *Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain (SCP3c)	Critically Endangered	Endangered		2		Community J1 shared some similarities with this TEC.	Not identified
Banksia attenuata and/or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain (SCP20b)	Endangered	-		3	The following vegetation type may align with these TECs: • "Low Open Woodland of remnant *Eucalyptus marginata* and *Banksia* spp. over a native mid-storey of mixed native species and an understorey of either mixed native species or weedy grasses and herbs". A total of 2.7 ha of this vegetation was recorded within the Swan River to Domestic Terminal area. This vegetation was degraded and has lost some of its structural integrity. However, this vegetation type contained some of the species that occur within these TECs.	Community I1 shared some similarities with this TEC.	Not identified
Banksia attenuata woodland over species rich dense shrublands (SCP20a)	Endangered	-		48		Community J1 shared some similarities with this TEC.	The following vegetation unit may align with this TEC: • *Allocasuarina fraseriana* low open woodland over *Xanthorrhoea preissii* open shrubland over *Verticordia densiflora* var. *densiflora*, *Hibbertia hypericoides* low shrubland over *Alexgeorgea nitens*, *Caustis dioica* open sedgeland/herbland/grassland.
Shrublands and woodlands of the eastern side of the Swan Coastal Plain (SCP20c)	Critically Endangered	Endangered		5		Not identified	The following vegetation units may align with this TEC: • *Allocasuarina fraseriana* low open woodland over *Xanthorrhoea preissii* open shrubland over *Verticordia densiflora* var. *densiflora*, *Hibbertia hypericoides* low shrubland over *Alexgeorgea nitens*, *Caustis dioica* open sedgeland/herbland/grassland. • *Corymbia calophylla* (Marri) open woodland (regrowth) over *Verticordia densiflora* var. *densiflora* low open heath over *Caustis dioica*, *Hypolaena exsulca* very open sedgeland/herbland.

Threatened Ecological Community (TEC)	Status		Occurrences of DPaW buffers		Assessment of vegetation within the Study Area		
	State	Federal	Within Study Area	Additional within 5 km of Study Area	GHD	Mattiske Consulting Pty Ltd (2008)	Morgan (2013)
Herb rich saline shrublands in clay pans (SCP07)	Vulnerable	Critically Endangered	3	1	Not identified	Not identified	Not identified
Southern wet shrublands, Swan Coastal Plain (SCP02)	Endangered	-		6	Not identified	Not identified	Not identified
Eucalyptus calophylla [now *Corymbia calophylla*] – *Eucalytpus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain (SCP3b) (identified in Morgan, 2013)	Vulnerable	-			Not identified	Not identified	The following vegetation unit may align with this TEC: • *Corymbia calophylla* (Marri) open woodland (regrowth) over *Verticordia densiflora* var. *densiflora* low open heath over *Caustis dioica*, *Hypolaena exsulca* very open sedgeland/herbland.
Claypans of the Swan Coastal Plain (identified in DSEWPaC, 2013) – may be the same as SCP07 or SCP09 (Dense shrublands on clay flats). However, the DotE (DSEWPaC, 2013) search did not identify the State-listed TEC.	Vulnerable	Critically Endangered	"Community likely to occur within the area" (DSEWPaC, 2013)		Not identified	Not identified	Not identified
Total			4	72			

5.5 Flora

5.5.1 Flora diversity

Desktop reviews of the Western Australian Museum/DPaW NatureMap search reported 1056 flora species recorded within 5 km of the Study Area.

A total of 203 flora species from 53 families and 138 genera were recorded within the Study Area by GHD. This number includes 145 native species and 58 introduced/planted species. Dominant families recorded during the survey were:

- Fabaceae: 29 taxa
- Myrtaceae: 23 taxa
- Proteaceae: 19 taxa

5.5.2 Conservation significant flora

Species of significant flora are protected under both Federal and State legislation. Any activities that are deemed to have a significant impact on species that are recognised by the EPBC Act, and/or the WC Act can warrant referral to the DotE and/or the EPA.

In Western Australia, DPaW also maintains a list of Priority listed flora species. Conservation codes for Priority species are assigned by DPaW to define the level of conservation significance.

For the purposes of this assessment, all species listed under the EPBC Act, WC Act and DPaW Priority species are considered conservation significant. Further information on the conservation codes relevant to this report is provided in Appendix C.

GHD requested searches of the DPaW Threatened Flora (DEFL) and the Western Australian Herbarium (WAHERB) databases with a 5 km buffer around the Study Area. These records were collated with the Protected Matters Search Tool (PMST) and Western Australian Museum/DPaW NatureMap records with a search radius of 5 km. Three individuals of *Conospermum undulatum* (listed as Threatened under the WC Act and Vulnerable under the EPBC Act) have previously been recorded within the Study Area boundary. In addition, the searches identified 54 species of conservation significance as occurring or potentially occurring within 5 km of the Study Area (Appendix B).

A total of 27 individuals of the wavy-leaved smokebush (*Conospermum undulatum*) was recorded within the High Wycombe area during the Level 2 survey (Plate 1). These were observed within the “Sparse Woodland of *Corymbia calophylla* over *Xanthorrhoea preissii* and low shrubs, sedges and herbs” and within the Poison Gully Bush Forever Site (see Section 4.4) (vegetation type “Remnant *Eucalyptus marginata*/*E. rudis*/*Corymbia calophylla* Woodland over a mid-storey and understorey of mixed native species”). This species is an erect, compact shrub, growing from 0.6 m to 2 m high, producing in May to October woolly, white flowers held in an inflorescence positioned well above the leaves. The leaves taper towards the base and have three distinct, parallel veins and characteristic wavy margins (DSEWPaC, 2013a). Regionally, *C. undulatum* is found in a restricted area in fragmented remnant bushland in an area of approximately 7200 ha between the suburbs of High Wycombe and Martin, in the foothills of the Darling Scarp of Perth (DSEWPaC, 2013a). Suitable habitat is being cleared for development and roads or degraded due to climate change, invasive flora (weeds) and fauna (rabbit) species, disturbance by vehicles, dieback, inappropriate and/or changed fire regimes and lack of secure conservation land tenure (DSEWPaC, 2013a).

Scattered occurrences of *Calothamnus rupestris* (P4) was tentatively recorded within the "Low Open Woodland of remnant *Eucalyptus marginata* and *Banksia* spp. over a native mid-storey of mixed native species and an understorey of either mixed native species or weedy grasses and herbs" (Figure 4, Appendix A) during the Level 1 survey. *Calothamnus rupestris* generally occurs on granite outcrops, rocks and hillsides in the Northern Jarrah Forest, east of Perth with a disjunct population at Boyaga Rock (Department of Agriculture, 1987).

In addition, one Priority 4 species, *Eucalytpus caesia*, was identified in roadside plantings along Dundas Road within the High Wycombe area. This species is found on loam and granite outcrops in the Wheatbelt region of Western Australia.

Calothamnus rupestris and *Eucalyptus caesia* have been planted as ornamentals and within rehabilitation across the south-west of Western Australia and have become naturalised outside of their range. These species are commonly planted in urban environments and their presence within the Study Area is not considered to be a natural occurrence.

Likelihood of occurrence assessment

A likelihood of occurrence assessment of conservation significant species (based on the range, habitat requirements and previous records of the species) (Appendix D) determined that there are 27 species which may occur or have been recorded within the Study Area. The majority of these species are only predicted to occur within the remnant vegetation of the Study Area (within the Perth Airport, alongside Dundas Road (High Wycombe area) and within the Poison Gully Bush Forever Site). Of these 27 species, only *Conospermum undulatum* was identified during the field survey. As much of the Study Area is highly degraded, there is low potential for the other 26 species to occur within the majority of the Study Area.

Table 17 Conservation significant flora species possibly occurring or likely to occur within the Study Area

Taxa	Common name	Status	
		State	Federal
Andersonia gracilis	Slender Andersonia	T	E
Bolboschoenus medianus		P1	
Boronia humifusa		T	
Byblis gigantea	Rainbow Plant	P3	
Caladenia huegelii	Grand Spider Orchid	T	E
Conospermum undulatum	Wavyleaf Smokebush	T	V
Cyathochaeta teretifolia		P3	
Dampiera triloba		P1	
Grevillea curviloba subsp. incurva	Narrow curved-leaf Grevillea	T	E
Haemodorum loratum		P3	
Halgania corymbosa		P3	
Hydrocotyle lemnoides	Aquatic Pennywort	P4	
Hydrocotyle striata		P1	
Hypocalymma sp. Cataby (G.J. Keighery 5151)		P2	
Isopogon drummondii		P3	
Jacksonia sericea	Waldjumi	P4	
Lasiopetalum bracteatum	Helena Velvet Bush	P4	
Lepyrodia curvescens		P2	
Macarthuria keigheryi		T	E

Taxa	Common name	Status	
		State	Federal
Melaleuca viminalis		P2	
Platysace ramosissima		P3	
Schoenus griffinianus		P3	
Schoenus pennisetis		P1	
Thelymitra stellata	Star Sun Orchid	T	
Thysanotus anceps		P3	
Verticordia fimbrilepis subsp. *fimbrilepis*		T	E
Verticordia lindleyi subsp. *lindleyi*		P4	

A detailed likelihood of occurrence assessment is provided in Appendix D.

Conservation codes are provided in Appendix C

5.5.3 Introduced flora

The Study Area was highly disturbed, with roads, housing and other clearing a predominant feature. The majority of the Study Area was invaded by common weeds, including garden escapees. Furthermore, the understorey of areas of remnant vegetation was dominated by introduced species with 57 introduced/planted species identified during the GHD surveys. None of these species are listed as Weeds of National Significance or Declared Pests under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) (which replaces the repealed *Agriculture and Related Resources Protection Act 1976*).

Plate 1 *Conospermum undulatum* (State Threatened & Federal Vulnerable) identified within the Study Area

6. Fauna

6.1 Desktop review

6.1.1 Existing fauna records

Excluding freshwater aquatic and marine species a *NatureMap* search located 271 fauna species recorded from within 5 km of the Study Area. The PMST predicts seven additional native fauna species to occur within this Study Area. Combining all database searches, a total of 278 fauna species are known or predicted to occur within 5 km of the Study Area.. These include:

- 22 mammals (17 native and five introduced)
- 210 birds (202 native and eight introduced)
- 11 frogs (all native)
- 35 reptiles (34 native and one introduced)

The diversity of fauna within the search area is considered high, particularly considering the location of the Study Area and surrounding land use (e.g. highly modified, predominantly urban and industrial). This high diversity is most likely because of the recent higher levels of survey effort associated with the nearby ongoing environmental impact assessment projects and the nearby conservation reserves including Munday Swamp, Gooseberry Hill National Park, Munday Regional Park, the Eric Singletone Bird Sanctuary, and parklands and reserves along the Swan River.

6.1.2 Conservation significant fauna

The conservation of fauna species and their significance status is currently assessed under both Federal (EPBC Act) and State (WC Act) Acts. Conservation significant fauna include those fauna listed under the EPBC Act, WC Act and the Priority list of fauna produced by DPaW. The conservation codes for fauna under the various Acts/list are detailed in Appendix C.

Of the 264 native terrestrial fauna species recorded from the databases, 34 species (23 birds, seven mammals, three reptiles and one invertebrate) are listed under one or more of the EPBC Act, WC Act or DPaW Priority list. A list of conservation significant fauna known from or predicted to occur within the Study Area is provided in Table 18.

A likelihood of occurrence assessment was conducted for each of these species (Table 18).

6.2 Field survey

6.2.1 Fauna species

During the survey 42 fauna species were recorded within the Study Area (all surveys combined), consisting of 35 birds (all native), four mammals (three native and one exotic), two reptiles (native) and one frog (native). All species recorded within the Study Area during the survey have previously been identified in a *NatureMap* search.

At least three of the species recorded during the survey are species of conservation significance (see Figure 6):

- Two Carnaby's Black Cockatoos (*Calyptorhynchus latirostris*) were observed flying over the site on one occasion, south along the Tonkin Highway (GHD 2012a).During the same

survey four other unidentified black cockatoos were observed flying north along the edge of the Swan River.

- A small flock of Carnaby's Black Cockatoo was recorded flying north-south over the High Wycombe area and was observed alighting in a stand of Marri in the southern portion of the site. A separate small flock of unidentified Black Cockatoo (*Calyptorhynchus* sp.) was also heard flying over north-east later in the afternoon during the same survey (GHD, 2013b)
- A female and juvenile Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii subsp. naso*) were observed foraging within the vegetation of Poison Gully Creek (High Wycombe area) during the most recent surveys (September 2013). Suitable foraging, night roosting and potential breeding hollows were also recorded within the habitat along Poison Gully Creek
- Recent and historic foraging evidence (e.g. chewed marri nuts) was recorded in all wood land habitats within the Study Area. Black Cockatoo species are known to feed on a wide variety of flora species including *Allocasuarina*, *Eucalyptus* and *Banksia* and other proteaceous species, all of which were identified within the Study Area (DSEWPaC, 2012b)
- Quenda (*Isoodon obesulus fusciventer*) Priority 4 listed. This species was recorded in habitat north of the Tonkin Highway and south of Stanton Road, within the Perth Airport land and the High Wycombe area. A Quenda was recorded foraging beneath a thicket of the introduced Victorian tea tree in the southern portion of the High Wycombe site, and Quenda diggings/scratching were recorded in multiple locations in the southern portion of the site.

Active reptile searches did not record the intended target species (the P3 listed Perth-lined Skink).

6.2.2 Fauna habitat

The fauna habitat types at the Study Area are closely aligned with the vegetation types (reported in Sections 5.3.1 and 5.3.2).

The majority of the remnant vegetation is generally confined to small linear, fragmented patches alongside the highway, inside the airport land and the High Wycombe area. Whilst some habitat is connected to other patches of nearby habitat (e.g. the Perth Airport land), there are no large intact patches of habitat within the Study Area.

Furthermore the intrinsic value of much of the habitat is diminished from the constant pressure of urbanisation and development (e.g. predation from cats and dogs, increased competition with introduced rodents, dumping of rubbish, weeds and removal of fallen timber for firewood and 'cleaning up'). A large portion of the central part of the High Wycombe area between Dundas Road and the rail line has been recently cleared and graded.

The key fauna habitat values of the Study Area are summarised below.

Woodland & open woodland habitats

This habitat is primarily located along the Tonkin Highway south and north of the Swan River, within the Perth Airport land and the High Wycombe area. The woodland habitat comprises up to 19.5 ha of 14 small patches of habitat (Figure 6) fragmented by roads, houses, rail lines and other development. This woodland provides habitat for species of conservation concern including Black Cockatoos' and the Quenda. The largest of these patches comprise of scattered *Corymbia calophylla* and/or *Eucalyptus rudis* over a modified understorey situated between the

Tonkin Highway and residential housing, Perth Airport land and Poison Gully Creek within the High Wycombe area.

On elevated ground above the river this habitat comprised of small linear patches with poor to moderately intact understorey of low open woodland of remnant *Eucalyptus marginata* and *Banksia* spp., or remnant *Eucalyptus marginata* and *Corymbia calophylla* woodland, or scattered *Corymbia calophylla* and/or *Eucalyptus rudis.*

Along the foot slopes leading to the river and along the river this habitat consisted of remnant *Eucalyptus rudis* open woodland with poor to moderately intact understorey. Along the river's edge remnant *Casuarina obesa* low woodland over an understorey of *Juncus* sp. and weedy grasses and herbs dominated.

Woody debris (e.g. hollow logs, fallen branches) was uncommon, with most being removed to tidy areas, or possibly for firewood. Ground debris in the form of leaf litter and smaller branches was localised and common in remnant woodland but is, however, generally uncommon from the majority of the Study Area. Larger *E. rudis* trees along the river provided small and medium hollows for native birds, bats and possum. Larger hollows suitable for large owl species and Black Cockatoos were very uncommon.

The woodland within the High Wycombe area are closely aligned with the vegetation and primarily consist of open woodland of Marri and Jarrah over a mixed understorey. Woody debris (e.g. hollow logs, fallen branches) was uncommon. Ground debris in the form of leaf litter and smaller branches was localised and common where overstorey was present, however, was generally uncommon for the majority of the area.

The majority of the northern part of the High Wycombe area between Dundas Road and the rail line was cleared and consisted of scattered trees and a small patch of open woodland.

Revegetated areas

Revegetation in the form of planted native trees and shrubs was commonly recorded along both sides of the highway, and in other parts of the Study Area. Most of the revegetation is a result of rehabilitation works from construction of the highway and adjacent road upgrades. In some areas, the dense shrubs provide important refuge for native fauna including the Quenda which was recorded in a dense patch of *Chamelaucium uncinatum* adjoining remnant woodland of *Eucalyptus marginata* and *Banksia* spp. south-west of the Perth Airport. Planted native shrubs and trees, also enhances the remaining remnant vegetation, and in some places provides local connectivity between remnants and other habitat types (e.g. the river and adjoining habitats along the highway).

Large areas of the introduced Victorian tea tree dominated some sections of the High Wycombe area between Dundas Road and the rail line. While considered an invasive native, this species provides habitat for native fauna including the DPaW Priority 4 species, Quenda (*Isoodon obesulus* subsp. *fusciventer*), which was recorded foraging beneath a thicket of the tea tree. Quenda diggings/scratching were recorded in multiple locations.

Ephemeral and artificial water bodies

Two small (0.5 hectares) low lying areas were recorded north of the Swan River adjacent the bridge within the Study Area (Figure 6). These lower lying areas would be ephemeral wetlands during times of higher rainfall, and would act as important refuge for breeding for frogs when inundated. One of these areas is constructed (artificial), probably for storm water harvesting. However, it now contains areas of *Typha* sp. and other native rushes and sedges, with planted Melaleuca around the fringes of the wetland.

Two ephemeral drainage lines (stormwater channels) were recorded north of Bassendean Road, and between the highway and River Road (Figure 6). Each is approximately 1 m wide, and up to 1.5 m deep. The vegetation along each appears to be regularly maintained (e.g. slashed and mowed). Whilst not providing any significant habitat features, the drainage lines may provide ephemeral habitat for native frogs, and facilitate the movement of frog species through the site during times of flow.

A small drain runs along the western boundary of the High Wycombe area between Dundas Road and the rail line. The drainage line is mostly hidden below the High Wycombe Study Area boundary (Figure 6). In the northern section the drain is fed by Poison Gully Creek via a culvert under Dundas Road. Whilst not providing any significant habitat features, the drain may provide ephemeral habitat for native frogs including the Sign-bearing froglet (*Crinia insignifera*), which was recorded within the Study Area, and facilitate the movement of frog species through the Study Area during times of flow.

Swan River

The river provides a diverse array of aquatic habitat values. However, the vegetation and associated habitat, particularly below the existing bridge along the River-edge is modified and limited.

Poison Gully Creek

The area surrounding the creek is a Bush Forever site. A female and juvenile Forest Red-tailed Black-Cockatoo were observed foraging within the vegetation of Poison Gully Creek during the most recent surveys. Suitable foraging, night roosting and potential breeding hollows were also recorded for Black Cockatoo within the habitat along Poison Gully Creek. In addition the creek has aquatic habitat values, and the riparian vegetation forms part of a local corridor for the movement of fauna.

6.2.3 Black Cockatoo habitat

The habitat assessment identified a total of up to 19.5 ha of habitat, with 125 trees of suitable DBH to be considered as potential breeding trees across the Study Area (Figure 6). The dominant species were:

- *Corymbia calophylla* (Marri) (60 trees including one potential nesting hollow)
- *Eucalyptus marginata* (Jarrah) (31 trees including one potential nesting hollow)
- *Eucalyptus rudis* (Flooded Gum) (20 trees including one potential nesting hollow)
- *Eucalyptus gomphocephala* (eight trees)
- Dead trees and other Eucalypts (six trees).

Trees of this size are considered to have nesting potential now, or will develop hollows within 100 years (DSEWPaC, 2012b). Of the 125 trees of suitable DBH, three (Figure 6) were identified with potentially suitable hollows for Black Cockatoo nesting. The survey did not record any direct observations of Black Cockatoos occupying hollows.

Figure 6 displays the location of potential breeding trees and trees with potential nesting hollows recorded during the field survey for Black Cockatoo within the Study Area.

The woodlands and open woodlands habitats discussed in Section 6.2.2 provide small areas of Black Cockatoo feeding habitat within the Study Area. Several of the flora species that are known to be feeding resources for cockatoo species were recorded during the field survey (particularly *Eucalyptus rudis* and *Allocasuarina fraseriana)*, along the Swan River. Two small patches of scattered *Corymbia calophylla* were also recorded on the southern and northern side

of the Tonkin Highway, north of Dunstone Road. Foraging habitat was recorded within the Perth Airport land. Foraging, potential night roosting and breeding habitat was recorded within the High Wycombe area.

Habitat connectivity

The Study Area is surrounded by a highly modified landscape within established urban and industrial land, hence any remaining remnant vegetation should be considered as important habitat for native fauna species. The majority of the habitat is located along the Tonkin Highway, which is intersected by numerous service roads and a major rail line. Much of the Study Area has previously been cleared and the functionality of the remaining remnant vegetation has been reduced. Subsequently the corridor values (habitat linkages) alongside roads are diminished. While providing some connectivity in the local area, these areas are unlikely to provide important habitat connectivity for the broader area/region.

The Swan River and associated riparian vegetation, although somewhat fragmented, provides an important corridor connecting habitats of the Study Area via the road and adjoining vegetated areas (e.g. the parklands and reserves located along the Swan River foreshore).

The vegetation in the High Wycombe area provides for limited fauna movements between Poison Gully Creek and a larger patch of vegetation along Crumpet Creek located on the eastern side of Dundas Road. The habitat serves as a 'stepping stone' between other habitats in the locality for species which are capable of traversing fragmented landscapes (e.g. birds such as the Black Cockatoo). While providing some connectivity in the locality, the Study Area is unlikely to provide important habitat connectivity within the region.

6.2.4 Likelihood of occurrence

An assessment on the likelihood of conservation significant fauna species occurring in the Study Area was conducted (Appendix E). This assessment was based on species biology, habitat requirements, the quality and availability of suitable habitat and records of the species in the area. The assessment concluded that two species are known from the Study Area (Carnaby's Black Cockatoo, Forest Red tailed Black Cockatoo and Quenda) and six species were likely to occur within the Study Area (Table 18).

Table 18 Summary of fauna species likely occur in the Study Area (based on likelihood of occurrence assessment)

Scientific name	Common name	Status		Likelihood of occurrence
		State	Federal	
Reptiles				
Lerista lineata	Perth-lined Skink	P3	-	Likely. This species was not recorded within the Study Area. However, given the cryptic nature of this species it is still considered likely that it could occur within the woodland habitats of the Study Area south of the river.
Birds				
Calyptorhynchus latirostris	Carnaby's Cockatoo (short-billed black-cockatoo)	T	V	Recorded. Flying along the Tonkin Highway and within the High Wycombe area.

Scientific name	Common name	Status		Likelihood of occurrence
		State	Federal	
Calyptorhynchus banksii subsp. *naso*	Forest Red-tailed Black-Cockatoo	T	E	Recorded. Poison Gully Creek High Wycombe area.
Merops ornatus	Rainbow Bee-eater	IA	MT	Likely. Along the Swan River.
Falco peregrinus	Peregrine Falcon	S	-	Likely.
Mammals				
Hydromys chrysogaster	Water-rat	P4	-	Likely – within the Swan River and Poison Gully Creek.
Isoodon obesulus subsp. *fusciventer*	Quenda	P4	-	Recorded. Adjacent the Tonkin Highway in revegetation and in Victorian tea tree in the High Wycombe area.
Invertebrates				
Synemon gratiosa	Graceful Sun Moth	P4	-	Likely. In woodland habitats adjoining the Tonkin Highway. Unlikely for habitat within Perth Airport as targeted surveys have not recorded the species (PAPL 2013).

A detailed likelihood of occurrence assessment is provided in Appendix E.

Conservation codes are provided in Appendix C.

IA	International Agreement
MT	Migratory terrestrial species
P3	Priority 3
P4	Priority 4
S	Other specially protected fauna
T	Threatened
V	Vulnerable

7. Potential constraints

This assessment investigated the ecological and broader environmental aspects of the Study Area as defined in Section 1.3. It is difficult to determine at this stage of the Project the level of potential impact to the broader environmental and ecological values of the Study Area (e.g. how many hectares of Black Cockatoo foraging habitat would be cleared) given that the alignment selection process is to be reviewed and only one option selected. It is unlikely that the entirety of any of the broader environmental and ecological values identified in this report would be modified or removed by the proposed Project. A definitive number (e.g. area of clearance) cannot be provided until the alignment review process is completed.

There are a number of potential environmental and ecological constraints within the Study Area. Given that the Project is still in the planning phase the PTA has the opportunity to review and refine the alignment to avoid and/or minimise adverse environmental impacts.

7.1 Flora & vegetation

The main constraints of the project relating to flora and vegetation are:

- All vegetation associations and complexes mapped as occurring within the Study Area have less than 30 percent of their pre-European/pre-1750 extents remaining. However, the Study Area may be considered to be within a constrained area of the Swan Coastal Plain (EPA, 2006a). In this case, Beard (1979) vegetation association 1018 and all the Heddle et al. (1980) vegetation complexes are present at greater than 10 percent of their pre-European/pre-1750 extents remaining and would not, therefore, be considered critical assets. Vegetation associations 1001 (in the Cities of Bayswater and Belmont and the Shire of Kalamunda) and 1009 (in the City of Bayswater) are present at less than 10 percent of their pre-European extent remaining, and may, therefore, be considered critical assets.
- Three of the vegetation types identified within the Study Area during the 2013 GHD surveys had affinities with five TECs that have previously been recorded within 5 km of the Study Area. In addition, Mattiske Consulting Pty Ltd (2008) suggested similarities between identified vegetation types within the Perth Airport portion of the Study Area and four TECs. The Morgan (2013) survey of part of the Study Area suggested similarities between identified vegetation units and four TECs.
- A total of 27 individuals of the wavy-leaved smokebush (*Conospermum undulatum*) (listed as Threatened under the WC Act and Vulnerable under the EPBC Act) was recorded within the High Wycombe area during the GHD Level 2 survey. Two Priority 4 flora species (*Calothamnus rupestris* and *Eucalytpus caesia*) were also recorded during the GHD field surveys, although these species have been planted as ornamentals and within rehabilitation across the south-west of Western Australia and have become naturalised outside of their range. These species are commonly planted in urban environments and their presence within the Study Area is not considered to be a natural occurrence.
- There is the potential for an additional five Federally listed flora species (all State Threatened and Federally Endangered) to occur within the Study Area. However, these species were not recorded during the field surveys:
  - *Andersonia gracilis*
  - *Caladenia huegelii*
  - *Grevillea curviloba* subsp. *incurva*
  - *Macarthuria keigheryi*

– *Verticordia fimbrilepis* subsp. *fimbrilepis*

7.2 Fauna

The main faunal constraints of the Project include:

- Up to 19.5 ha of foraging habitat, and potential night roosting and breeding habitat (although this is restricted to the Poison Gully Creek habitat) and 125 potential breeding habitat trees, for the threatened Black Cockatoo species.
- Up to 19.5 ha of woodland and additional planted shrub habitat (e.g. Victorian tea tree) for the Quenda
- The native vegetation and associated habitat, likely to be used by fauna of conservation significance including the Perth-lined Skink (woodland habitat) and the Water Rat (riparian woodland habitat along the Swan River and Poison Gully Creek).
- The vegetation which is used by fauna species for habitat and local linkages between areas of habitat. Clearing or modification of this habitat, will only further reduce the overall area of habitat available to fauna species within the Study Area and locality.

Impacts to the habitat for fauna including conservation significant fauna (e.g. removal of habitat from clearing) are likely to be unavoidable for this Project. However, there is likely to be opportunity for the Project to reduce the extent of these direct impacts during an alignment review and refinement process.

7.3 Other

The Study Area crosses one Bush Forever Site (386) and intersects the corner of another (45 – Poison Gully Creek). The Project should consider avoidance and minimisation to these values during an alignment review and refinement process. Furthermore, 10 geomorphic wetlands (including three conservation category wetlands) and two wetlands of national significance occur within the Study Area. The conservation significant wetlands are located in association with the Swan River and the Perth Airport woodland swamps (see Section 4.5). The Project requires consideration of these areas in order to avoid or minimise impacts on these wetlands. Indirect impacts, such as impacting on surface water flows or groundwater must also be considered.

8. Approvals

The purpose of this section is to discuss the significance of the identified constraints (Section 7) with regard to the requirements under Federal and State environmental legislation. This discussion is limited to the Study Area outside of the airport land.

8.1 Federal — *Environment Protection and Biodiversity Conservation Act 1999*

The Federal EPBC Act promotes the conservation of biodiversity by providing protection for threatened species, threatened ecological communities, migratory and marine species and other protected matters. There are nine Matters of National Environmental Significance (MNES) identified in the EPBC Act of which two may occur in, or relate to, the Study Area (nationally threatened species and ecological communities, and migratory species) (Table 19).

Table 19 Matters of National Environmental Significance which may occur, or relate to, the Study Area

Matter of National Environmental Significance (MNES)	MNES present within 5 km of the Study Area
World heritage properties	None
National heritage places	None
Wetlands of international importance	None
Great Barrier Reef Marine Park	None
Nuclear action	None
Commonwealth marine areas	None
A water resource in relation to coal seam gas development and large coal mining development	None)
Nationally threatened species and ecological communities	34 (see Section 5.5.2 and 6.1.2) and 3 (see Section 0), respectively. See also Section 8.1.1.
Migratory species	12 (see Section 8.1.2).

(DotE, 2013)

8.1.1 Nationally threatened species & ecological communities

Threatened Ecological Communities

There is the potential for two Federally listed TECs (both Endangered) to occur within the Study Area:

- *Eucalyptus calophylla* [now *Corymbia calophylla*] – *Kingia australis* woodlands on heavy soils, Swan Coastal Plain (SCP3a)
- *Eucalyptus calophylla* [now *Corymbia calophylla*] – *Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain (SCP3c)

Consultation with DPaW will be required to determine if these areas are considered to be TECs. If DPaW advises that they are considered to be TECs, the Project will likely require referral under the EPBC Act.

Flora

A total of 27 individuals of the wavy-leaved smokebush (*Conospermum undulatum*) (listed as Threatened under the WC Act and Vulnerable under the EPBC Act) were recorded within the High Wycombe area during the Level 2 survey. These were observed within the "Sparse Woodland of *Corymbia calophylla* over *Xanthorrhoea preissii* and low shrubs, sedges and herbs" and within the Poison Gully Bush Forever Site (see Section 4.4) (vegetation type "Remnant *Eucalyptus marginata*/*E. rudis*/*Corymbia calophylla* Woodland over a mid-storey and understorey of mixed native species"). Disturbance to any of these species would likely require referral under the EPBC Act.

There is the potential for an additional five Federally Endangered (and Threatened under the WC Act) flora species to occur within the Study Area. However, these species were not recorded during the field surveys:

- *Andersonia gracilis*
- *Caladenia huegelii*
- *Grevillea curviloba* subsp. *incurva*
- *Macarthuria keigheryi*
- *Verticordia fimbrilepis* subsp. *fimbrilepis*

Fauna

At least two fauna species (Carnaby's Black Cockatoo and Forest Red-tailed Black-Cockatoo) were recorded within the Study Area during the surveys.

The Graceful Sun Moth is no longer listed under the EPBC Act, therefore requires no further consideration under the Act. The species was also delisted from the WC Act and is now listed as Priority 4 by DPaW.

No additional terrestrial EPBC listed fauna species were identified as having known or potentially suitable habitat within the Study Area.

Black Cockatoo

In order to review the potential constraints to the Black Cockatoo species within the Study Area, the DotE (DSEWPaC, 2012b) EPBC Act referral guidelines for three threatened Black Cockatoo species were consulted. Within these guidelines, DotE provides a risk table that gives guidance on what it views as risks/impacts to Black Cockatoos that will trigger referral. Risk is broken into three categories: high, uncertain and low and primarily focuses on breeding, feeding and roosting areas as well as indirect impacts. If there is uncertainty with regard to risks on Black Cockatoos then the DotE recommends referring the Project or contacting the DotE to ensure legal certainty.

It is difficult to determine at this stage of the Project how much foraging and potential breeding habitat may be impacted. It is very unlikely that the entire 19.5 ha and all 125 trees would be modified or removed. However, a definitive number cannot be provided until the alignment review process is completed.

In its current state, the proposed Project is considered to be at risk of significant impact to the one or more of the three species of Black Cockatoo and is likely to trigger the need for referral

because it is likely that more than 1 ha of quality foraging habitat would be removed by the proposed Project.

However this Project is still in the preliminary stages and the full extent of clearing is unknown. Once further information (e.g. preferred alignment, extent of clearing and construction methods) regarding the Project is known, the need to refer and the significance of impacts to these species should be re-visited.

8.1.2 Migratory species

One terrestrial migratory listed species (Rainbow Bee-eater) was considered likely to occur within the Study Area. However, no important habitat for any of the EPBC Act migratory (terrestrial, wetland or marine) species mentioned in this report would be substantially removed or modified as part of the proposed works. The proposed works are unlikely to disrupt the lifecycle of an ecologically significant proportion of a population of listed migratory species. The Project is unlikely to result in an invasive species that is harmful to a listed migratory species becoming established in an area of important habitat for listed migratory species. It is unlikely that listed migratory species would be significantly impacted by the proposed works.

8.2 State legislation

8.2.1 Part IV of *Environmental Protection Act* 1986

Significant proposals, such as development activities, must be referred to the Environmental Protection Authority (EPA) under Section 38 of the EP Act. The EPA evaluates a proposal to determine the extent of the impact, and is dependent upon the following factors:

- The extent and consequence of impacts on biophysical aspects
- The environmental values of the areas affected
- The extent of emissions and their potential to unreasonably interfere with the health, welfare, convenience, comfort or amenity of people
- The extent and rigour to which potential impacts have been investigated and described in the referral, and the confidence in the reliability of predicted impacts
- The extent to which the proposal implements the principles of sustainability
- The ability of decision-making authorities to place conditions on the proposals to ensure required environmental outcomes are achieved
- The likely level of public interest and the extent to which the proponent has consulted with interested and affect people and responded to constraints raised

Due to the size of the Project and environmental constraints identified it is considered the Project should be discussed with the EPA to determine whether referral under Section 38 of the EP Act is required.

8.2.2 Clearing Permit under Part V of the *Environmental Protection Act 1986*

Any clearing of native vegetation requires a clearing permit under Part V of the EP Act, except when a project is assessed under Schedule 6 of the Act or is prescribed by regulation in the *Environmental Protection (Clearing Native Vegetation) Regulations 2004*. Commonwealth land is not subject to this permit requirement.

Table 20 provides an indicative assessment of the proposed clearing of the entire Study Area against the “Ten Clearing Principles”, as outlined in the EP Act, to determine whether it is at variance to the Principles. These Principles aim to ensure that all potential impacts resulting from removal of native vegetation can be assessed in an integrated way. The assessment against the Ten Clearing Principles determined that based on the current Study Area the proposed Project is likely to be at variance with Principles a, c, d, e and f and may be at variance with Principles b, g, h and i.

This Project is still in the preliminary stages and the extent of clearing is unknown. To provide an idea of potential constraints associated with this project the assessment against the clearing principles assumed that clearing of the entire Study Area will be required. Once further information regarding the project is known, including the clearing requirements, the assessment against the clearing principles can be refined.

8.2.3 *Wildlife Conservation Act* 1950

The WC Act provides for the conservation and protection of wildlife. It is administered by the Department of Environmental Regulation (DER) (formerly DEC) and applies to both flora and fauna. Any person wanting to capture, collect, disturb or study flora or fauna requires a permit to do so.

A permit is required under the WC Act if removal of flora and fauna species and ecological communities protected under the Act is required.

Table 20 Assessment against the Ten Clearing Principles

Principle	Assessment of principle of the portion of the Study Area outside the Perth Airport boundary*	Outcome
(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.	A total of 1056 native flora species and 264 native fauna species have been recorded within 5 km of the Study Area. The field surveys identified 145 native flora species and 41 native fauna species. As the majority of the Study Area has been highly modified and degraded, the diversity of native flora is lower than may be expected. Broadscale vegetation mapping of the area undertaken by Beard (1979) identified the following vegetation associations within the Study Area: • Medium very sparse woodland; jarrah, with low woodland; *Banksia* & Casuarina (association 1001). • Medium woodland; marri & river gum (association 1009). • Mosaic: Medium forest; jarrah–marri/Low woodland; banksia/Low forest; teatree/Low woodland; *Casuarina obesa* (association 1018). Heddle et al. (1980) mapped the following vegetation complexes within the Study Area: • Swan Complex (complex 33). • Southern River Complex (complex 42). • Bassendean Complex — central and south (complex 44). The Beard (1979) and Heddle et al. (1980) vegetation associations and complexes have less than 30 percent of their pre-European/pre-1750 extents remaining. However, the Study Area may be considered to be within a constrained area of the Swan Coastal Plain. In this case, Beard (1979) vegetation association 1018 and all of the Heddle et al. (1980) vegetation complexes are present at greater than 10 percent of their pre-European/pre-1750 extents remaining and would not, therefore, be considered critical assets. However, vegetation associations 1001 (in the Cities of Bayswater and Belmont and the Shire of Kalamunda) and 1009 (in the City of Bayswater) are present at less than 10 percent of their pre-European extent remaining, and may, therefore, be considered critical assets at this level. The Study Area exists within remnant vegetation and completely altered areas, roads and open water. Within the Study Area the following extents of each vegetation type were mapped: • Low Open Woodland of remnant *Eucalyptus marginata* and *Banksia* spp. over a native mid-storey of mixed native species and an understorey of either mixed native species or weedy grasses and herbs (2.7 ha). • Remnant *Casuarina obesa* Low Woodland over an understorey of *Juncus* sp. and weedy grasses and herbs (0.74 ha). • Remnant *Melaleuca cuticularis* Open Shrubland over an understorey of weedy grasses and herbs (0.37 ha). • Remnant *Eucalyptus rudis* Open Woodland over completely altered understorey in drainage lines (2.6 ha). • Remnant *Eucalyptus marginata*/*E. rudis*/*Corymbia calophylla* Woodland over a mid-storey and understorey of mixed native species (3.1 ha). • Sparse Woodland of *Corymbia calophylla* and/or *Eucalyptus rudis* over a weedy understorey (2.2 ha). • *Corymbia calophylla*, *Melaleuca preissiana* and *Banksia* spp. over *Xanthorrhoea preissii*, *Hypocalymma angustifolium* and *Dasypogon bromeliifolius*, *Pericalymma ellipticum* var. *ellipticum* and *Astartea scoparia* (2.6 ha). • Scattered *Corymbia calophylla* and/or *Eucalyptus rudis*/*Corymbia calophylla* Woodland over a mid-storey and understorey of mixed native species (12 ha).	Likely to be at variance.

Principle	Assessment of principle of the portion of the Study Area outside the Perth Airport boundary*	Outcome
	• Plantings of non-native species over an understorey of weedy grasses and herbs (2.9 ha). • Areas rehabilitated with native and non-native species following road-works (29 ha). The desktop assessments determined that three individuals of the wavy-leaved smokebush, *Conospermum undulatum* (listed as Threatened under the WC Act and Vulnerable under the EPBC Act), have previously been recorded within the Study Area boundary. Approximately 27 individuals of this species were identified within the High Wycombe area during the Level 2 survey. In addition, scattered occurrences of *Calothamnus rupestris* (Priority 4) was tentatively recorded within the "Low Open Woodland of remnant *Eucalyptus marginata* and *Banksia* spp. over a native mid-storey of mixed native species and an understorey of either mixed native species or weedy grasses and herbs". This species is generally found on granite outcrops, rocks and hillsides east of Perth. Another Priority 4 species, *Eucalytpus caesia*, was identified in roadside plantings along Dundas Road. This species is found on loam and granite outcrops in the Wheatbelt region of Western Australia. As these species are commonly planted as ornamental species or in rehabilitation, their presence within the Study Area is not considered to be a natural occurrence. A likelihood of occurrence assessment (based on the range, habitat requirements and previous records of the species) identified 27 flora species of conservation significance likely to occur or potentially occurring within the Study Area. However with the exception of *Conospermum undulatum*, these species were not recorded during the field surveys. The buffers of four occurrences of TECs are present within the Study Area. Based on the desktop assessment and GHD survey, three GHD vegetation types showed affinities with the following six TECs that have previously been recorded within 5 km of the Study Area: • *Eucalyptus calophylla* [now *Corymbia calophylla*] – *Kingia australis* woodlands on heavy soils, Swan Coastal Plain (SCP3a) (Critically Endangered) (identified in Mattiske Consulting Pty Ltd, 2008; Morgan, 2013; and the 20136 GHD survey) • *Eucalyptus calophylla* [now *Corymbia calophylla*] – *Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain (SCP3c) (Critically Endangered) (identified in Mattiske Consulting Pty Ltd, 2008; and the 2013 GHD survey) • *Banksia attenuata* and/or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain (SCP20b) (Critically Endangered) (identified in Mattiske Consulting Pty Ltd, 2008; and the 2013 GHD survey) • *Banksia attenuata* woodland over species rich dense shrublands (SCP20a) (Critically Endangered) (identified in Mattiske Consulting Pty Ltd, 2008; Morgan, 2013; and the 2013 GHD survey) • Shrublands and woodlands of the eastern side of the Swan Coastal Plain (SCP20c) (Critically Endangered) (identified in Morgan, 2013; and the 2013 GHD survey) • *Eucalyptus calophylla* [now *Corymbia calophylla*] – *Eucalytpus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain (SCP3b) (Vulnerable) (identified in Morgan, 2013)	
(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	The GHD survey identified 41 native fauna species within the Study Area of which three species (Carnaby's Black Cockatoo, Forest Red tailed Black Cockatoo and Quenda) were fauna of conservation significance (see Section 6.2.1). Key fauna constraints identified for the Study Area include: • Up to 19.5 ha of foraging habitat and 125 potential breeding habitat trees, for the Carnaby's Black Cockatoo • Up to 19.5 ha of woodland habitat for the Quenda. • Native vegetation and associated habitat, likely to be used by fauna of conservation significance including the Perth-lined Skink (woodland habitat) and the Water Rat	May be at variance given the presence and current extent of fauna habitat including habitat for fauna of conservation significance (e.g. 19.5 ha of foraging habitat for Black Cockatoo) that may be impacted by the Project.

Principle	Assessment of principle of the portion of the Study Area outside the Perth Airport boundary*	Outcome
	(riparian woodland and aquatic habitat along the Swan River and Poison Gully Creek). It is difficult to determine at this stage of the Project how much of this habitat for the conservation significant fauna known from or likely to occur within the Study Area may be impacted by the Project given that the alignment selection process is to be reviewed. It is unlikely that the entire area of habitat identified within the Study Area for any one of these fauna species would be removed,	
(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.	A total of 27 individuals of the Threatened species, *Conospermum undulatum,* were recorded during the GHD survey, within the High Wycombe area. A likelihood of occurrence assessment of conservation significant species (based on the range, habitat requirements and previous records of the species) identified the following seven Threatened species as potentially occurring within the Study Area: • *Andersonia gracilis* • *Boronia humifusa* • *Caladenia huegelii* • *Grevillea curviloba* subsp. *incurva* • *Macarthuria keigheryi* • *Thelymitra stellata* • *Verticordia fimbrilepis* subsp. *fimbrilepis* The majority of these species are only predicted to occur within the remnant vegetation of the Study Area (within the Perth Airport, within the High Wycombe area and within the Poison Gully Bush Forever Site). As the much of the Study Area is highly degraded, the potential for these species to occur within the majority of the Study Area is not considered to be great. These species were not recorded during the field surveys.	Likely to be at variance.
(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.	Desktop assessment identified eight TEC within 5 km of the Study Area. The buffers of four occurrences of TECs are present within the Study Area. Based on the desktop assessment and GHD survey, three GHD vegetation types showed affinities with the following six TECs that have previously been recorded within 5 km of the Study Area: • *Eucalyptus calophylla* [now *Corymbia calophylla*] – *Kingia australis* woodlands on heavy soils, Swan Coastal Plain (SCP3a) (Critically Endangered) (identified in Mattiske Consulting Pty Ltd, 2008; Morgan, 2013; and the GHD survey) • *Eucalyptus calophylla* [now *Corymbia calophylla*] – *Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain (SCP3c) (Critically Endangered) (identified in Mattiske Consulting Pty Ltd, 2008; and the GHD survey) • *Banksia attenuata* and/or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain (SCP20b) (Critically Endangered) (identified in Mattiske Consulting Pty Ltd, 2008; and the GHD survey) • *Banksia attenuata* woodland over species rich dense shrublands (SCP20a) (Critically Endangered) (identified in Mattiske Consulting Pty Ltd, 2008; Morgan, 2013; and the GHD survey) • Shrublands and woodlands of the eastern side of the Swan Coastal Plain (SCP20c) (Critically Endangered) (identified in Morgan, 2013; and the GHD survey) • *Eucalyptus calophylla* [now *Corymbia calophylla*] – *Eucalytpus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain (SCP3b) (Vulnerable) (identified in Morgan, 2013)	Likely to be at variance.
(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an	All Beard (1979) vegetation associations and Heddle et al. (1980) vegetation complexes have less than 30 percent of their pre-European/pre-1750 extents remaining. However, the Study Area may be	Likely to be at variance, if clearing occurs within the Poison Gully Bush Forever Site and the TECs.

Principle	Assessment of principle of the portion of the Study Area outside the Perth Airport boundary*	Outcome
area that has been extensively cleared.	considered to be within a constrained area of the Swan Coastal Plain. In this case, Beard (1979) vegetation association 1018 and all of the Heddle et al. (1980) vegetation complexes are present at greater than 10 percent of their pre-European/pre-1750 extents remaining and would not, therefore, be considered critical assets. Vegetation associations 1001 (in the Cities of Bayswater and Belmont and the Shire of Kalamunda) and 1009 (in the City of Bayswater) are present at less than 10 percent off their pre-European extent remaining, and may, therefore, be considered critical assets at the Local Government Area level. The Swan Coastal Plain has been severely impacted upon with the vegetation of the Study Area disjunct from other bushland areas. The vegetation associated with Poison Gully Bush Forever Site is considered as being part of a regionally significant fragmented bushland/wetland linkage which is a regionally significant but not contiguous linkage of bushland/wetland areas. This area is of particular significance as it is considered to provide corridors through otherwise highly cleared lands and provide linkages of regional significance. There is a total of 1970 ha (approximately 12 percent of the whole area) of vegetation remaining within 5 km of the Study Area (Department of Agriculture and Food Western Australia native vegetation extent: Government of Western Australia, 2012). Clearing of the remnant vegetation associated within the Study Area (27 ha, 1.4 percent of the 1970 ha remaining) is not considered to significantly reduce the remaining vegetation within 5 km of the Study Area. The vegetation potentially aligning with the previously discussed TECs may represent significant remnant native vegetation within the extensively cleared Swan Coastal Plain.	To minimise the potential to be at variance with this clearing principle the final alignment should be placed in areas mapped as *Completely Degraded*.
(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	The Study Area intersects a number of wetlands, including wetlands of local, regional and national significance. The Study Area also includes a number of dampland areas within the Perth Airport boundary (including 2.6 ha of vegetation type "*Corymbia calophylla*, *Melaleuca preissiana* and *Banksia* spp. over *Xanthorrhoea preissii*, *Hypocalymma angustifolium* and *Dasypogon bromeliifolius*, *Pericalymma ellipticum* var. *ellipticum* and *Astartea scoparia*"). The Study Area also intersects 3.7 ha of riparian vegetation associated with the Swan River and 3.1 ha of vegetation associated with the Poison Gully Creek.	At variance. Possible variance can be minimised if clearing of vegetation associated with the wetlands can be avoided, by placing the alignment within the already cleared areas. Future environmental investigations should include an assessment of potential impacts to watercourses and wetlands within the Study Area.
(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	Much of the Study Area is immediately adjacent to existing cleared areas. This indicates that the Study Area exists within land which is capable of withstanding the intended use and is not considered likely to increase ground water recharge, surface water runoff or nutrient export. There is, however, the potential for soil erosion, particularly in the sloped areas, such as in the vicinity of the Swan River.	May be at variance. Management measures during clearing and construction are required to prevent erosion during and following clearing. Hygiene measures should be implemented to reduce the risk of the spread of dieback and weed species. Wherever possible, construction associated with the Project should be limited to previously disturbed areas, to minimise potential variance with this clearing principle. If vegetation clearing is required it is preferable to clear adjacent to existing cleared areas to prevent edge effects and increased weed/disease invasion.
(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	There are no conservation reserves within the Study Area. There are limited tracts of vegetation (within Bush Forever Sites) within and adjacent to the Study Area that act as fragmented ecological linkages and buffers.	May be at variance. Wherever possible, construction associated with the Project should be limited to previously disturbed areas, to minimise potential variance with this clearing principle.
(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	It is expected that the majority of vegetation clearing associated with the Study Area can be restricted to already cleared areas. This assessment did not include an assessment of watercourses or public drinking water supply catchments. Future investigations should include consideration of these constraints to allow adequate assessment of the Project against this principle. The Study Area also includes a number of dampland areas within the Perth Airport boundary (including 2.6 ha of vegetation type "*Corymbia calophylla*, *Melaleuca preissiana* and *Banksia* spp. over *Xanthorrhoea preissii*, *Hypocalymma angustifolium* and *Dasypogon bromeliifolius*, *Pericalymma ellipticum* var. *ellipticum* and *Astartea scoparia*"). The Study Area also intersects 3.7 ha of riparian vegetation associated with the Swan River and 3.1 ha of vegetation associated with the Poison Gully Creek. There is the potential for deterioration of these damplands and the Swan River due to sedimentation associated with construction in wet periods. As much of the Study Area is already surrounded by a highly altered landscape on the Swan Coastal Plain, it is not considered likely that clearing of 54.9 ha of vegetation (remnant and rehabilitation) will	May be at variance. Incorporation of engineering controls should be included in the design of the railway and associated infrastructure to mitigate impacts on the quality and flow of surface or underground water. A Construction Environmental Management Plan should include measures to prevent run-off of chemicals and fuel from the site and to ensure appropriate drainage controls. Appropriate management measures should mitigate potential impacts.

Principle	Assessment of principle of the portion of the Study Area outside the Perth Airport boundary*	Outcome
	cause deterioration in quality of surface or underground water.	
(j) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.	The areas of vegetation surrounding the Swan River have already been extensively disturbed. It is expected that construction can be restricted to previously disturbed areas, limiting the impact upon this vegetation. Potential impacts on flooding are only likely to occur if significant areas of vegetation are removed, resulting in additional shedding of rainfall and subsequent downstream flooding. Due to the generally highly permeable soil types in the Study Area, is unlikely that the clearing would lead to additional flooding.	Unlikely to be at variance with clearing principle. Appropriate drainage design should mitigate potential impacts.

* Unless otherwise indicated, the limited information provided by Mattiske Consulting Pty Ltd (2008) and Morgan (2013) has not allowed for a full assessment of the Ten Clearing Principles within the Perth Airport boundary and the High Wycombe area, respectively.

9. Recommendations & conclusions

The constraints identified in this assessment require further consideration during the planning stages of the Project, particularly during the refinement of the proposed rail alignment. A number of the constraints can be minimised with careful planning, considering the avoidance, and then minimisation approach. However, if other environmental or technical construction constraints are more restrictive , the Project may result in unavoidable impacts to flora, fauna and wetlands.

At this stage of the assessment there are three main recommendations that could be used during the design and planning phase of the Project which has the potential to avoid, then minimise potential impacts to the environmental and ecological values identified within this report including:

- Placing infrastructure required for the Project within cleared and/or disturbed areas
- Tunnelling the alignment
- Placing the alignment along the midline (median strip) of the Tonkin Highway.

9.1.1 Alignment selection process

GHD understands that one of the alignment options is to tunnel for the majority of its length. Tunnelling would avoid the majority of the terrestrial environmental values identified in the Study Area by this report. However tunnelling may also cause other unintended adverse impacts (e.g. disruption to ground water flows) which were not assessed as part of this scope.

In the case of placing the alignment option on the surface, it is recommended that an alignment selection and refinement process be undertaken in order to reduce the potential impacts on the environment. It is recommended that the alignment be placed within the currently disturbed areas (e.g. the midline of the highway), and areas of lesser ecological value such as cleared areas and areas of planted vegetation, wherever possible in order to minimise the extent of clearing of the remaining native vegetation and habitat.

Depending on the outcomes of the alignment selection and refinement process, further environmental investigations may be required at later stages of the Project, including an environmental impact assessment. This should include an assessment of the significance of impacts to flora and fauna, and wetlands and also consider other environmental constraints not covered in this ecological assessment, including contaminated sites, land use, groundwater, noise, and heritage constraints.

9.1.2 Offsets

Flora and fauna impacts should be avoided wherever possible. If this is not possible, attempts should be made to minimise the impacts. If there are any remaining significant impacts on environmental values and the Project continues to be at variance with any of the Ten Clearing Principles, offsets may be required to compensate for those impacts and to achieve a net environmental benefit. Both the State and Federal Governments operate policies that permit offsets to be developed after all avoidance and mitigation efforts have been exhausted (EPA, 2006a). The provision of offsets (if required) would require further discussions with DotE, EPA, DER and DPaW and should reflect the offset principles.

9.1.3 General management recommendations

An Environment Management Plan (EMP) for the preferred alignment is recommended following the alignment selection and review process. The following recommendations are not site or

species specific, but rather aim to provide an outline of the minimum recommendations required for the EMP or similar document. Adherence to these measures would help to minimise the unavoidable impacts to broader environmental and ecological values within the preferred alignment. The EMP would include planning, pre-construction, construction and post-construction measures aimed at minimising the impacts to the ecological values.

Additional surveys and recommendations

- For completeness, it is recommended that a Level 1 flora and fauna survey within the inaccessible areas be conducted. The purpose of conducting these surveys would be to ground-truth the findings of the desktop assessment and appropriately determine the environmental values of these areas.
- Consultation with DPaW regarding the potential TECs that may occur within the Study Area.

Flora, vegetation & fauna

- All occurrences of, and any habitat suitable for, the Threatened flora species, *Conospermum undulatum*, should be avoided.
- Ensure that a qualified ecologist walk the proposed alignments prior to final alignment selection in order to avoid as many constraints as possible (e.g. hollow-bearing trees, flora species of conservation significance).
- Clearing should be kept to the minimum necessary for proposed activity. Demarcate all native vegetation and fauna habitats to be retained via erection of orange para-webbing fencing, so that “No Go” zones are clearly delineated and noted by construction workers, and any accidental loss of vegetation is avoided.
- Pre-clearance fauna surveys are recommended for the Quenda and other conservation significant fauna species (e.g. Black Cockatoo species), pending the final alignment selection process. Appropriately trained and licenced personnel (DER regulation 17 permit) would need to conduct a pre-clearance survey and would be required on site to supervise and handle any native fauna that may be residing within the habitat to be removed. The pre-clearance survey would be conducted, immediately before commencement of clearing. This would involve the development and implementation of fauna-handling and relocation protocols for the safe handling and removal of native fauna when removing fauna habitat including felling hollow-bearing trees.
- Induct all staff and contractors working within the study area regarding biodiversity constraints and required actions regarding biodiversity values
- Implement weed and pathogen management practices, including:
  - Consultation with DPaW regarding the most appropriate dieback management controls for the area
  - The induction programme shall involve hygiene training to ensure all personnel are aware of the requirements to prevent the spread of weeds and pathogens
  - All vehicles and machinery that will access the site shall be checked to ensure they are free from soil/organic matter prior to arrival on site
  - Imported construction materials shall be designated as free of weeds and pathogens (specifically dieback)
- Measures for topsoil management and regeneration using existing seed including:
  - Stockpiled topsoil should be respread evenly across the revegetation areas and any stockpiled vegetation placed to assist in soil retention and provide seed stock

  - Where necessary, regeneration can be encouraged by scarification (loosening the top few centimetres) or the soil)
  - Topsoil will be respread to a maximum depth of 100 mm across the areas to be revegetated
- Topsoil stockpiles should be:
  - As low as possible with a large surface area (1.5 m high or less)
  - Stabilised with vegetation or other soil stabilisers to protect from erosion (if the stockpile is expected to be required for a few months or more before reuse)
  - In a location without disturbance
  - Not on or adjacent to weed infested areas.

Drainage

- Drainage design should aim to reduce the risk of erosion and flooding.
- An appropriate stormwater management system should be developed to protect the existing environmental assets on the Study Area and receiving environments located downstream of the Study Area.
- The EMP should make provision for surface water, groundwater and drainage management actions.
- In accordance with current best practice stormwater management the development will be required to provide for stormwater retention and drainage within the lot boundary. The option adopted for the Study Area will be determined from site-specific geotechnical investigations.

Dust, noise & vibration

- Depending on the timing of the project, it is possible that due to hot, dry climatic conditions, dust suppression will be required during clearing and construction activities.
- PTA should consult with the local shire and relevant stakeholders regarding construction operations and any requirements for approval of a Noise Management Plan.
- Construction activities are required to comply with the *Environmental Protection (Noise) Regulations 1997*.

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Appendices

Appendix A — Figures

397,500 400,000 402,500 405,000

6,467,500

6,465,000

6,462,500

Bassendean Rd

River Rd

Dunstone Rd

Swan River

Station Rd

Maida Vale Rd

Dundas Rd

Locality Map

PERTH

BYFORD

Note : Alignments used in mapping were to our knowledge the most up todate provided by PTA and are subject to change

1:29,168 (at A3)

0 125250 500 750 1,000 1,250

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

LEGEND

- Option 1
- Option 2
- Option 3
- Study Area
- **Perth Airport Precinct Boundaries**
- Commercial Development
- Conservation Areas
- Runways and Taxiways
- Terminal, Hangar and Aviation Support Development

GHD

Public Transport Authority

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Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number 61-29970
Revision 2
Date 20 Jan 2014

Locality

Figure 1

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Data source: PTA: Options (1,2,3) - 20131008, Perth Airport Precinct Boundaries - 20131009; GHD: Study Area - 20131010; Landgate: Metro Central Mosaic - 2013 ; GA: 250K Australian Topographic Series - 2006. Created by: vdinh

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398,000 399,000 400,000

6,468,000

6,467,000

398,000 399,000 400,000

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

LEGEND

- Option 1
- Option 2
- Option 3
- Road
- Heddle Vegetation Class
- PreEuropean Vegetation
- Environmentally Sensitive Areas
- Bush Forever
- **Perth Airport Precinct Boundaries**
- Commercial Development
- Conservation Areas
- Runways and Taxiways
- Terminal, Hangar and Aviation Support Development
- Study Area

GHD

Public Transport Authority

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Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number	61-29970
Revision	2
Date	20 Jan 2014

Sheet 1 of 4

Desktop review: Environmental constraints

Figure 2a

G:\61\29970\GIS\Maps\Working\6129970_G005_Fig2a_Rev2.mxd

Data source: PTA: Perth Airport Precinct Boundaries - 20131008, Options (1,2,3) - 20131009; Landgate: Metro Central 2013 Mosaic - 20121211, Roads - 20121211; GHD: Study Area - 20130919,; GA: 250K Australian Topographic Series - 2006; DEC: Heddle Vegetation Class - 2010, Environmentally Sensitive Areas - 2012; DOP: Bush Forever - 20121128; DAFWA: PreEuropean Vegetation - 2005. Created by: vdinh

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au

399,000 400,000 401,000

6,467,000

6,466,000

Swan complex

1009

Swan complex

Swan River

Waterview Pde

Boulder Av

1009

Tonkin Hwy

Southern River complex

Tonkin Hwy

Great Eastern Hwy

1001

Bassendean complex - central and south

Station Rd

Guildford complex

Faunilleroy Av

BF ID: 386

Locality Map

1

2

3

4

PERTH

FREMANTLE

Note : Alignments used in mapping were to our knowledge the most up todate provided by PTA and are subject to change

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

LEGEND

- Option 1
- Option 2
- Option 3
- Road
- Heddle Vegetation Class
- PreEuropean Vegetation
- Environmentally Sensitive Areas
- Bush Forever
- **Perth Airport Precinct Boundaries**
- Commercial Development
- Conservation Areas
- Runways and Taxiways
- Terminal, Hangar and Aviation Support Development
- Study Area

GHD

Public Transport Authority

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Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number	61-29970
Revision	2
Date	20 Jan 2014

Desktop review: Environmental constraints

Sheet 2 of 4

Figure 2a

G:\61\29970\GIS\Maps\Working\6129970_G005_Fig2a_Rev2.mxd

Data source: PTA: Perth Airport Precinct Boundaries - 20131008, Options (1,2,3) - 20131009; Landgate: Metro Central 2013 Mosaic - 20121211, Roads - 20121211; GHD: Study Area - 20130919,; GA: 250K Australian Topographic Series - 2006; DEC: Heddle Vegetation Class - 2010, Environmentally Sensitive Areas - 2012; DOP: Bush Forever - 20121128; DAFWA: PreEuropean Vegetation - 2005. Created by: vdinh

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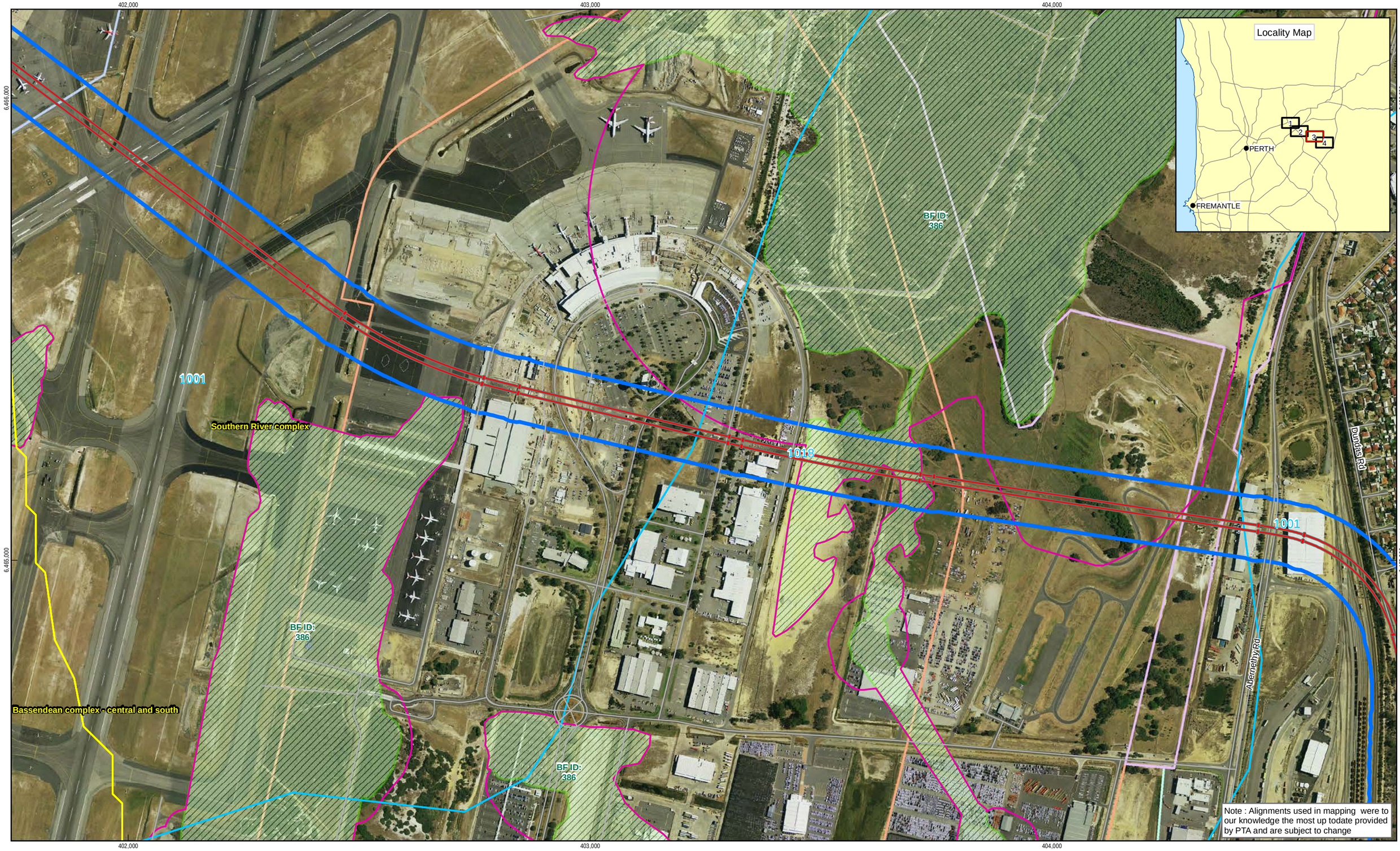
402,000 403,000 404,000

6,466,000

6,465,000



402,000 403,000 404,000

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

LEGEND

- Option 1
- Option 2
- Option 3
- Road
- Heddle Vegetation Class
- PreEuropean Vegetation
- Environmentally Sensitive Areas
- Bush Forever
- **Perth Airport Precinct Boundaries**
- Commercial Development
- Conservation Areas
- Runways and Taxiways
- Terminal, Hangar and Aviation Support Development
- Study Area

GHD

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Environmental Assessment

Job Number 61-29970
Revision 2
Date 20 Jan 2014

Desktop review: Environmental constraints

Sheet 3 of 4

Figure 2a

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G:\61\29970\GIS\Maps\Working\6129970_G005_Fig2a_Rev2.mxd

Data source: PTA: Perth Airport Precinct Boundaries - 20131008, Options (1,2,3) - 20131009; Landgate: Metro Central 2013 Mosaic - 20121211, Roads - 20121211; GHD: Study Area - 20130919,; GA: 250K Australian Topographic Series - 2006; DEC: Heddle Vegetation Class - 2010, Environmentally Sensitive Areas - 2012; DOP: Bush Forever - 20121128; DAFWA: PreEuropean Vegetation - 2005. Created by: vdinh

404,000 405,000 406,000

6,465,000 6,464,000

BF ID: 386

Abernethy Rd

Southern River complex

1018

1001

Maida Vale Rd

BF ID: 45

Poison Gully Creek

Dundas Rd

Forrestfield complex

BF ID: 123

BF ID: 123

BF ID: 386

Note : Alignments used in mapping were to our knowledge the most up todate provided by PTA and are subject to change

Locality Map

1 2 3 4

PERTH

FREMANTLE

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

LEGEND

- Option 1
- Option 2
- Option 3
- Road
- Heddle Vegetation Class
- PreEuropean Vegetation
- Environmentally Sensitive Areas
- Bush Forever
- **Perth Airport Precinct Boundaries**
- Commercial Development
- Conservation Areas
- Runways and Taxiways
- Terminal, Hangar and Aviation Support Development
- Study Area

Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number 61-29970
Revision 2
Date 20 Jan 2014

Sheet 4 of 4

Desktop review: Environmental constraints

Figure 2a

G:\61\29970\GIS\Maps\Working\6129970_G005_Fig2a_Rev2.mxd

Data source: PTA: Perth Airport Precinct Boundaries - 20131008, Options (1,2,3) - 20131009; Landgate: Metro Central 2013 Mosaic - 20121211, Roads - 20121211; GHD: Study Area - 20130919,; GA: 250K Australian Topographic Series - 2006; DEC: Heddle Vegetation Class - 2010, Environmentally Sensitive Areas - 2012; DOP: Bush Forever - 20121128; DAFWA: PreEuropean Vegetation - 2005. Created by: vdinh

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393,000 400,000 407,000 414,000

6,469,000

6,462,000

Bassendean Rd
Guildford Rd
River Rd
Dunstan Rd
Tonkin Hwy
Boulder Av
Stanton Rd
Faunteroy Av
Swan River
Abernethy Rd
Abernethy Rd
Dundas Rd
Maida Vale Rd
Poison Gully Creek

Note : Alignments used in mapping were to our knowledge the most up todate provided by PTA and are subject to change

1:70,000 (at A3)

0 0.375 0.75 1.5 2.25 3 3.75

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

Threatened (Declared Rare) & Priority Flora

- (T) Threatened Rare Flora - Extant Taxa; T
- Priority 1 - Poorly Known Taxa
- Priority 2 - Poorly Known Taxa
- Priority 3 - Poorly Known Taxa
- Priority 4 - Rare Taxa
- Priority 5 - Conservation Dependent Taxa
- Option 1
- Option 2
- Option 3
- Study Area
- Threatened Ecological Communities

Perth Airport Precinct Boundaries

- Commercial Development
- Conservation Areas
- Runways and Taxiways
- Terminal, Hangar and Aviation Support Development

GHD

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Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number	61-29970
Revision	2
Date	20 Jan 2014

Desktop review: Conservation significant flora & vegetation

Figure 2b

G:\61\29970\GIS\Maps\Working\6129970_G007_Fig2b_Rev2.mxd

Data source: PTA: Perth Airport Precinct Boundaries - 20131008, Options (1,2,3) -20131008Landgate: Metro Central 2013 Mosaic - 20121211, Roads - 20121211; GHD: Study Area - 20131010; GA: 250K Australian Topographic Series - 2006; DEC: Threatened (Declared Rare) & Priority Flora - 20121207, Threatened Ecological Communities - 20121210. Created by: vdinh

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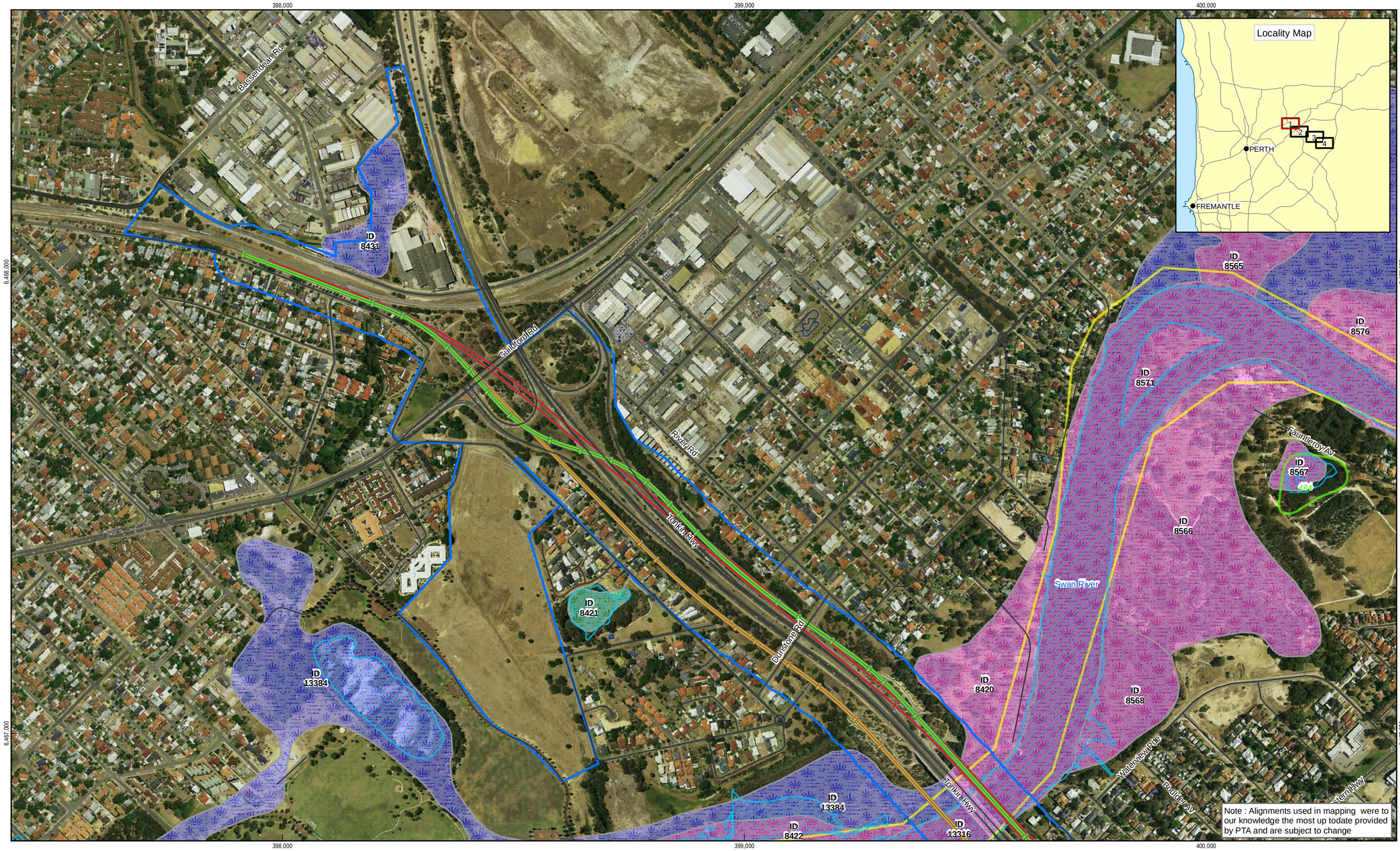

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

LEGEND

- Option 1
- Option 2
- Option 3
- Road
- Study Area
- Hydrology
- EPP Lakes
- Wetlands of National Significance

Geomorphic Wetlands

- Conservation
- Resource Enhancement
- Multiple Use

Perth Airport Precinct Boundaries

- Commercial Development
- Conservation Areas
- Runways and Taxiways
- Terminal, Hangar and Aviation Support Development

Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number	61-29970
Revision	2
Date	20 Jan 2014

Desktop review: Surface water

Figure 3

G:\61\29970\GIS\Maps\Working\6129970_G006_Fig3_Rev2.mxd

Data source: PTA: Precinct boundary - 2013108, Options (1,2,3) - 20131009; Landgate: Metro Central 2013 Mosaic - 20121211, Roads - 20121211, Hydrology - 20130115; GHD: Study Area - 20131010; GA: 250K Australian Topographic Series - 2006; DEC: Geomorphic Wetlands - 20121128; EPA: EPP Lakes - 20121128, Wetlands of National Significance - 20081015. Created by: vdinh

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399,000 400,000 401,000

6,467,000 6,466,000

ID 8420
ID 8568
ID 8571
ID 13384
ID 8422
ID 13316
ID 15264
ID 15054
490

Waterview Pde
Boulder Av
Faunteroy Av
Tonkin Hwy
Great Eastern Hwy
Stanton Rd

Locality Map
1
2
3
4
PERTH
FREMANTLE

Note : Alignments used in mapping were to our knowledge the most up todate provided by PTA and are subject to change

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

LEGEND

- Option 1
- Option 2
- Option 3
- Road
- Study Area
- Hydrology
- EPP Lakes
- Wetlands of National Significance

Geomorphic Wetlands

- Conservation
- Resource Enhancement
- Multiple Use

Perth Airport Precinct Boundaries

- Commercial Development
- Conservation Areas
- Runways and Taxiways
- Terminal, Hangar and Aviation Support Development

Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number 61-29970
Revision 2
Date 20 Jan 2014

Desktop review: Surface water

Sheet 2 of 4

Figure 3

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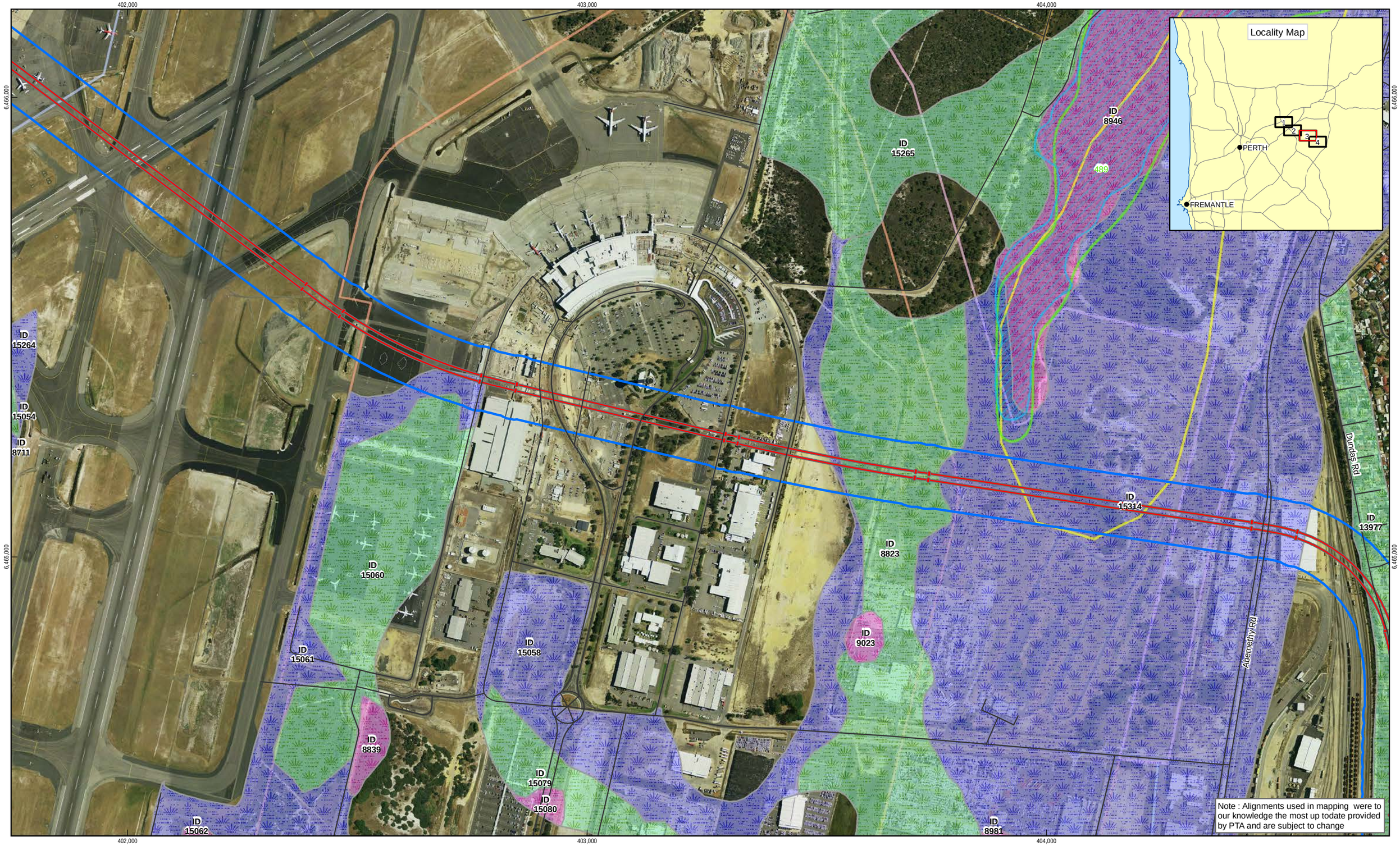

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

LEGEND

- Option 1
- Option 2
- Option 3
- Road
- Study Area
- Hydrology
- EPP Lakes
- Wetlands of National Significance

Geomorphic Wetlands

- Conservation
- Resource Enhancement
- Multiple Use

Perth Airport Precinct Boundaries

- Commercial Development
- Conservation Areas
- Runways and Taxiways
- Terminal, Hangar and Aviation Support Development

Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number 61-29970
Revision 2
Date 20 Jan 2014

Desktop review: Surface water

Sheet 3 of 4

Figure 3

G:\61\29970\GIS\Maps\Working\6129970_G006_Fig3_Rev2.mxd

Data source: PTA: Precinct boundary - 2013108, Options (1,2,3) - 20131009; Landgate: Metro Central 2013 Mosaic - 20121211, Roads - 20121211, Hydrology - 20130115; GHD: Study Area - 20131010; GA: 250K Australian Topographic Series - 2006; DEC: Geomorphic Wetlands - 20121128; EPA: EPP Lakes - 20121128, Wetlands of National Significance - 20081015. Created by: vdinh

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404,000 405,000 406,000

6,465,000

6,464,000

ID 15058
ID 9023
ID 8823
ID 15314
ID 15058
491
ID 8981
ID 8966
ID 15081
ID 8967
ID 8968
ID 15082
ID 9036
ID 8716
ID 9037
ID 8959
ID 9012
ID 13977
ID 8960

Abernethy Rd
Abernethy Rd
Maida Vale Rd
Poison Gully Creek
Dundas Rd

Locality Map
1
2
3
4
PERTH
FREMANTLE

Note : Alignments used in mapping were to our knowledge the most up todate provided by PTA and are subject to change

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

LEGEND

- Option 1
- Option 2
- Option 3
- Road
- Study Area
- Hydrology
- EPP Lakes

Geomorphic Wetlands

- Conservation
- Resource Enhancement
- Multiple Use
- Wetlands of National Significance

Perth Airport Precinct Boundaries

- Commercial Development
- Conservation Areas
- Runways and Taxiways
- Terminal, Hangar and Aviation Support Development

GHD

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Forrestfield Airport Link
Environmental Assessment

Job Number 61-29970
Revision 2
Date 20 Jan 2014

Desktop review: Surface water

Sheet 4 of 4

Figure 3

G:\61\29970\GIS\Maps\Working\6129970_G006_Fig3_Rev2.mxd

Data source: PTA: Precinct boundary - 2013108, Options (1,2,3) - 20131009; Landgate: Metro Central 2013 Mosaic - 20121211, Roads - 20121211, Hydrology - 20130115; GHD: Study Area - 20131010; GA: 250K Australian Topographic Series - 2006; DEC: Geomorphic Wetlands - 20121128; EPA: EPP Lakes - 20121128, Wetlands of National Significance - 20081015. Created by: vdinh

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397,750 398,500 399,250 400,000

6,468,000

6,467,250

Bassendean Rd

Guildford Rd

River Rd

Tonkin Hwy

Dunstone Rd

Fauntleroy Av

Waterview Pde

Boulder Av

Eastern Hwy

Locality Map

1 2 3 4

PERTH

FREMANTLE

Vegetation Type

- Areas rehabilitated with native and non-native species following road-works
- *Corymbia calophylla*, *Melaleuca preissiana* and *Banksia* spp. over *Xanthorrhoea preissii, Hypocalymma angustifolium and Dasypogon bromeliifolius, Pericalymma ellipticum* var. *ellipticum* and *Astartea scoparia* (corresponds to Mattiske Consulting Pty Ltd, 2008 J1)
- Low Open Woodland of remnant *Eucalyptus marginata* and *Banksia* spp. over a native mid-storey of mixed native species and an understorey of either mixed native species or weedy grasses and herbs (corresponds to GHD 2012 V10)
- Plantings of non-native species over an understorey of weedy grasses and herbs
- Remnant *Eucalyptus rudis* Open Woodland over completely altered understorey in drainage lines
- Remnant *Casuarina obesa* Low Woodland over an understorey of (*Juncus* sp. and) weedy grasses and herbs
- Remnant *Melaleuca cuticularis* Open Shrubland over an understorey of weedy grasses and herbs
- Remnant *Eucalyptus marginata/E. rudis/Corymbia calophylla* Woodland over a mid-storey and understorey of mixed native species
- Scattered *Corymbia calophylla* and/or *Eucalyptus rudis* over a weedy understorey
- Sparse Woodland of *Corymbia calophylla* over *Xanthorrhoea preissii* and low shrubs, sedges and herbs
- Open Water
- Roads/infrastructure/completely altered

Note : Alignments used in mapping were to our knowledge the most up todate provided by PTA and are subject to change

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

Conservation significant flora

- *Conospermum undulatum* State Threatened, Federal Vulnerable
- Scattered *Calothamnus rupestris* (P4)
- Quadrats & photo points
- Option 1
- Option 2
- Option 3
- Study Area
- Morgan (2013) survey area (not accessed)
- Inaccessible

Perth Airport Precinct Boundaries

- Commercial Development
- Conservation Areas
- Runways and Taxiways
- Terminal, Hangar and Aviation Support Development
- Mattiske Consulting Pty Ltd (2008) survey area within the Study Area

Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number	61-29970
Revision	2
Date	20 Jan 2014

Vegetation type & conservation significant flora

Sheet 1 of 4

Figure 4

G:\61\29970\GIS\Maps\Working\6129970_G001_Fig4_Rev2.mxd

Data source: PTA: Precinct boundary - 20131008, Options (1,2,3) 20131009; Landgate: Metro Central 2013 Mosaic - 20121211, Roads - 20121211; GHD: Mattiske study area - 20131121, Scattered *Calothamnus ?rupestris* (P4) - 20131008, Inaccessible - 20131010, Study Boundary - 20131010, Vegetation Type - 20131008, Threaten flora - 20130919, Morgan (2013) survey area - 20131001; GA: 250K Australian Topographic Series - 2006. Created by: vdinh

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399,250 400,000 400,750 401,500

6,466,500

Locality Map

1 2 3 4

PERTH

FREMANTLE

Faun

Water View Pde

Boulder Av

Great Eastern Hwy

Tonkin Hwy

Stanton Rd

Q01 Q02 Q03 Q04 RP01

Vegetation Type

- Areas rehabilitated with native and non-native species following road-works
- *Corymbia calophylla*, *Melaleuca preissiana* and *Banksia* spp. over *Xanthorrhoea preissii, Hypocalymma angustifolium and Dasypogon bromeliifolius, Pericalymma ellipticum* var. *ellipticum* and *Astartea scoparia* (corresponds to Mattiske Consulting Pty Ltd, 2008 J1)
- Low Open Woodland of remnant *Eucalyptus marginata* and *Banksia* spp. over a native mid-storey of mixed native species and an understorey of either mixed native species or weedy grasses and herbs (corresponds to GHD 2012 V10)
- Plantings of non-native species over an understorey of weedy grasses and herbs
- Remnant *Eucalyptus rudis* Open Woodland over completely altered understorey in drainage lines
- Remnant *Casuarina obesa* Low Woodland over an understorey of (*Juncus* sp. and) weedy grasses and herbs
- Remnant *Melaleuca cuticularis* Open Shrubland over an understorey of weedy grasses and herbs
- Remnant *Eucalyptus marginata/E. rudis/Corymbia calophylla* Woodland over a mid-storey and understorey of mixed native species
- Scattered *Corymbia calophylla* and/or *Eucalyptus rudis* over a weedy understorey
- Sparse Woodland of *Corymbia calophylla* over *Xanthorrhoea preissii* and low shrubs, sedges and herbs
- Open Water
- Roads/infrastructure/completely altered

Note : Alignments used in mapping were to our knowledge the most up todate provided by PTA and are subject to change

6,465,750

399,250 400,000 400,750 401,500

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

Conservation significant flora

- *Conospermum undulatum* State Threatened, Federal Vulnerable
- Scattered *Calothamnus rupestris* (P4)
- Quadrats & photo points
- Option 1
- Option 2
- Option 3
- Study Area
- Morgan (2013) survey area (not accessed)
- Inaccessible

Perth Airport Precinct Boundaries

- Commercial Development
- Conservation Areas
- Runways and Taxiways
- Terminal, Hangar and Aviation Support Development
- Mattiske Consulting Pty Ltd (2008) survey area within the Study Area

Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number	61-29970
Revision	2
Date	20 Jan 2014

Vegetation type & conservation significant flora

Sheet 2 of 4

Figure 4

G:\61\29970\GIS\Maps\Working\6129970_G001_Fig4_Rev2.mxd

Data source: PTA: Precinct boundary - 20131008, Options (1,2,3) 20131009; Landgate: Metro Central 2013 Mosaic - 20121211, Roads - 20121211; GHD: Mattiske study area - 20131121, Scattered *Calothamnus ?rupestris* (P4) - 20131008, Inaccessible - 20131010, Study Boundary - 20131010, Vegetation Type - 20131008, Threaten flora - 20130919, Morgan (2013) survey area - 20131001; GA: 250K Australian Topographic Series - 2006. Created by: vdinh

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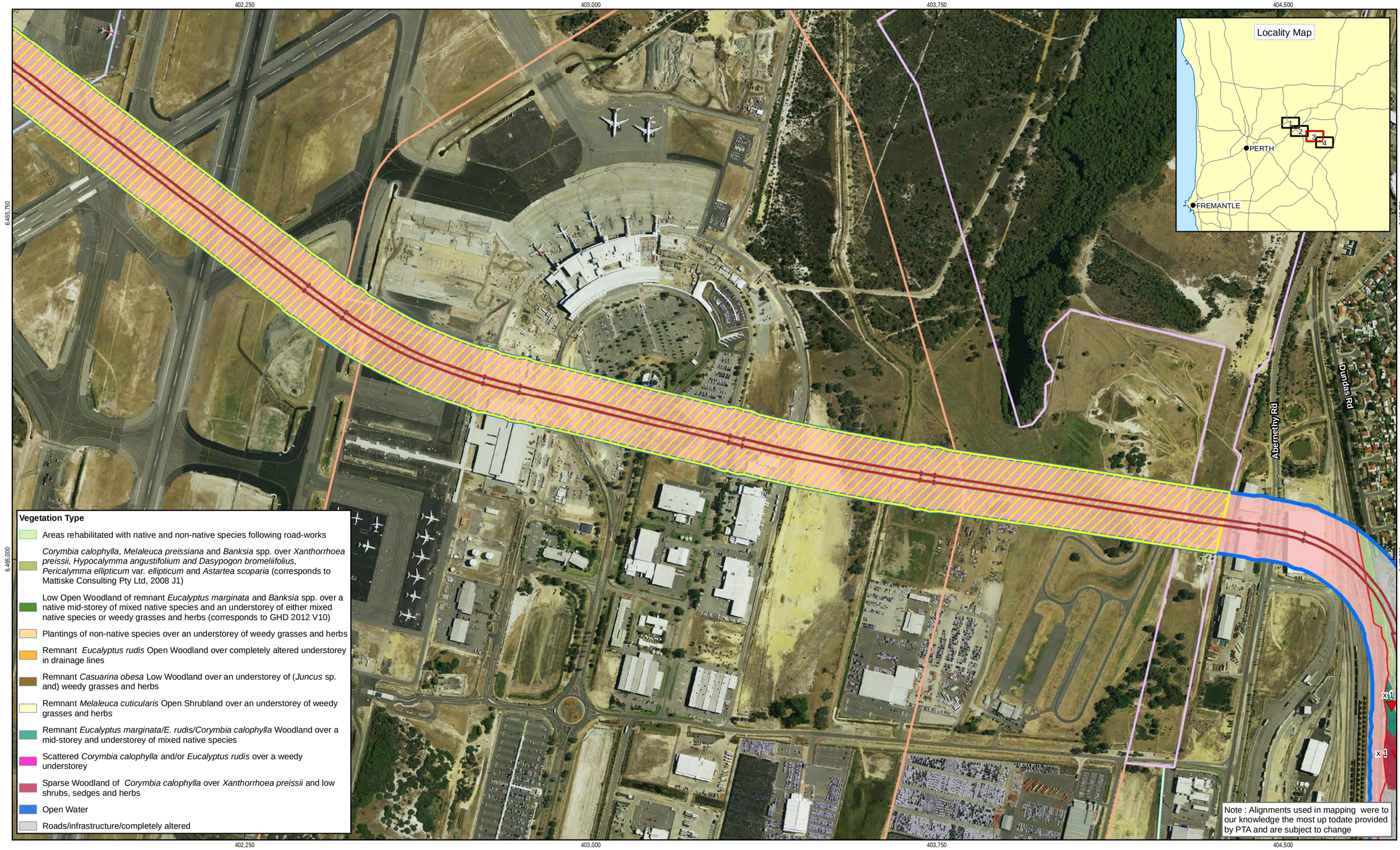
402,250 403,000 403,750 404,500

6,465,750 6,465,000



Vegetation Type

- Areas rehabilitated with native and non-native species following road-works
- *Corymbia calophylla*, *Melaleuca preissiana* and *Banksia* spp. over *Xanthorrhoea preissii, Hypocalymma angustifolium and Dasypogon bromeliifolius, Pericalymma ellipticum* var. *ellipticum* and *Astartea scoparia* (corresponds to Mattiske Consulting Pty Ltd, 2008 J1)
- Low Open Woodland of remnant *Eucalyptus marginata* and *Banksia* spp. over a native mid-storey of mixed native species and an understorey of either mixed native species or weedy grasses and herbs (corresponds to GHD 2012 V10)
- Plantings of non-native species over an understorey of weedy grasses and herbs
- Remnant *Eucalyptus rudis* Open Woodland over completely altered understorey in drainage lines
- Remnant *Casuarina obesa* Low Woodland over an understorey of (*Juncus* sp. and) weedy grasses and herbs
- Remnant *Melaleuca cuticularis* Open Shrubland over an understorey of weedy grasses and herbs
- Remnant *Eucalyptus marginata/E. rudis/Corymbia calophylla* Woodland over a mid-storey and understorey of mixed native species
- Scattered *Corymbia calophylla* and/or *Eucalyptus rudis* over a weedy understorey
- Sparse Woodland of *Corymbia calophylla* over *Xanthorrhoea preissii* and low shrubs, sedges and herbs
- Open Water
- Roads/infrastructure/completely altered

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

Conservation significant flora

- *Conospermum undulatum* State Threatened, Federal Vulnerable
- Scattered *Calothamnus rupestris* (P4)
- Quadrats & photo points
- Option 1
- Option 2
- Option 3
- Study Area
- Morgan (2013) survey area (not accessed)
- Inaccessible

Perth Airport Precinct Boundaries

- Commercial Development
- Conservation Areas
- Runways and Taxiways
- Terminal, Hangar and Aviation Support Development
- Mattiske Consulting Pty Ltd (2008) survey area within the Study Area

Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number	61-29970
Revision	2
Date	20 Jan 2014

Vegetation type & conservation significant flora

Sheet 3 of 4

Figure 4

G:\61\29970\GIS\Maps\Working\6129970_G001_Fig4_Rev2.mxd

Data source: PTA: Precinct boundary - 20131008, Options (1,2,3) 20131009; Landgate: Metro Central 2013 Mosaic - 20121211, Roads - 20121211; GHD: Mattiske study area - 20131121, Scattered *Calothamnus ?rupestris* (P4) - 20131008, Inaccessible - 20131010, Study Boundary - 20131010, Vegetation Type - 20131008, Threaten flora - 20130919, Morgan (2013) survey area - 20131001; GA: 250K Australian Topographic Series - 2006. Created by: vdinh

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403,750 404,500 405,250 406,000

6,465,000 6,464,250 6,463,500

Locality Map

PERTH

FREMANTLE

Maida Vale Rd

Abernethy Rd

Dundas Rd

x 1 x 1 x 2 x 1 x 3 x 1 x 5 x 10 x 3

Q05 Q08 Q07 Q06

Vegetation Type

- Areas rehabilitated with native and non-native species following road-works
- *Corymbia calophylla*, *Melaleuca preissiana* and *Banksia* spp. over *Xanthorrhoea preissii, Hypocalymma angustifolium and Dasypogon bromeliifolius, Pericalymma ellipticum* var. *ellipticum* and *Astartea scoparia* (corresponds to Mattiske Consulting Pty Ltd, 2008 J1)
- Low Open Woodland of remnant *Eucalyptus marginata* and *Banksia* spp. over a native mid-storey of mixed native species and an understorey of either mixed native species or weedy grasses and herbs (corresponds to GHD 2012 V10)
- Plantings of non-native species over an understorey of weedy grasses and herbs
- Remnant *Eucalyptus rudis* Open Woodland over completely altered understorey in drainage lines
- Remnant *Casuarina obesa* Low Woodland over an understorey of (*Juncus* sp. and) weedy grasses and herbs
- Remnant *Melaleuca cuticularis* Open Shrubland over an understorey of weedy grasses and herbs
- Remnant *Eucalyptus marginata/E. rudis/Corymbia calophylla* Woodland over a mid-storey and understorey of mixed native species
- Scattered *Corymbia calophylla* and/or *Eucalyptus rudis* over a weedy understorey
- Sparse Woodland of *Corymbia calophylla* over *Xanthorrhoea preissii* and low shrubs, sedges and herbs
- Open Water
- Roads/infrastructure/completely altered

Note : Alignments used in mapping were to our knowledge the most up todate provided by PTA and are subject to change

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

Conservation significant flora

- *Conospermum undulatum* State Threatened, Federal Vulnerable
- Scattered *Calothamnus rupestris* (P4)
- Quadrats & photo points
- Option 1
- Option 2
- Option 3
- Study Area
- Morgan (2013) survey area (not accessed)
- Inaccessible

Perth Airport Precinct Boundaries

- Commercial Development
- Conservation Areas
- Runways and Taxiways
- Terminal, Hangar and Aviation Support Development
- Mattiske Consulting Pty Ltd (2008) survey area within the Study Area

Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number	61-29970
Revision	2
Date	20 Jan 2014

Vegetation type & conservation significant flora

Sheet 4 of 4

Figure 4

G:\61\29970\GIS\Maps\Working\6129970_G001_Fig4_Rev2.mxd

Data source: PTA: Precinct boundary - 20131008, Options (1,2,3) 20131009; Landgate: Metro Central 2013 Mosaic - 20121211, Roads - 20121211; GHD: Mattiske study area - 20131121, Scattered *Calothamnus ?rupestris* (P4) - 20131008, Inaccessible - 20131010, Study Boundary - 20131010, Vegetation Type - 20131008, Threaten flora - 20130919, Morgan (2013) survey area - 20131001; GA: 250K Australian Topographic Series - 2006. Created by: vdinh

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397,750 398,500 399,250 400,000

6,468,000

6,467,250

Bassendean Rd
Guildford Rd
River Rd
Tonkin Hwy
Dunstone Rd
Swan River
Fauntleroy Av
Waterview Pde
Boulder Av
Eastern Hwy

Locality Map
1
2
3
4
PERTH
FREMANTLE

Note : Alignments used in mapping were to our knowledge the most up todate provided by PTA and are subject to change

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

Option 1
Option 2
Option 3
Mattiske Consulting Pty Ltd (2008) survey area within the Study Area

Vegetation Condition

1. Pristine
1-2
2. Excellent
2-3
3. Very Good
3-4
4. Good
4-5
5. Degraded
5-6
6. Completely Degraded
Inaccessible
Not Assessed

Perth Airport Precinct Boundaries

Commercial Development
Conservation Areas
Runways and Taxiways
Terminal, Hangar and Aviation Support Development

Morgan (2013) survey area (not accessed)
Study Area

GHD

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Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number	61-29970
Revision	2
Date	20 Jan 2014

Sheet 1 of 4

Vegetation condition

Figure 5

G:\61\29970\GIS\Maps\Working\6129970_G001_Fig5_Rev2.mxd

Data source: PTA: Perth Airport Precinct Boundaries - 20131008, Options (1,2,3) - 20131009; Landgate: Metro Central 2013 Mosaic - 20121211, Roads - 20121211; GHD: Mattiske study area - 20131121, Study Area - 20131010, Vegetation Condition - 20131008, Morgan (2013) Survey Area -2013 ; GA: 250K Australian Topographic Series - 2006. Created by: vdinh

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399,250 400,000 400,750 401,500

6,466,500 6,465,750

Waterview Pde
Boulder Av
Great Eastern Hwy
Tonkin Hwy
Station Rd
Faun

Locality Map
1
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PERTH
FREMANTLE

Note : Alignments used in mapping were to our knowledge the most up todate provided by PTA and are subject to change

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

Option 1
Option 2
Option 3
Mattiske Consulting Pty Ltd (2008) survey area within the Study Area

Vegetation Condition

1. Pristine
1-2
2. Excellent
2-3
3. Very Good
3-4
4. Good
4-5
5. Degraded
5-6
6. Completely Degraded
Inaccessible
Not Assessed

Perth Airport Precinct Boundaries

Commercial Development
Conservation Areas
Runways and Taxiways
Terminal, Hangar and Aviation Support Development

Morgan (2013) survey area (not accessed)
Study Area

GHD

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Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number 61-29970
Revision 2
Date 20 Jan 2014

Sheet 2 of 4

Vegetation condition

Figure 5

G:\61\29970\GIS\Maps\Working\6129970_G001_Fig5_Rev2.mxd

Data source: PTA: Perth Airport Precinct Boundaries - 20131008, Options (1,2,3) - 20131009; Landgate: Metro Central 2013 Mosaic - 20121211, Roads - 20121211; GHD: Mattiske study area - 20131121, Study Area - 20131010, Vegetation Condition - 20131008, Morgan (2013) Survey Area -2013 ; GA: 250K Australian Topographic Series - 2006. Created by: vdinh

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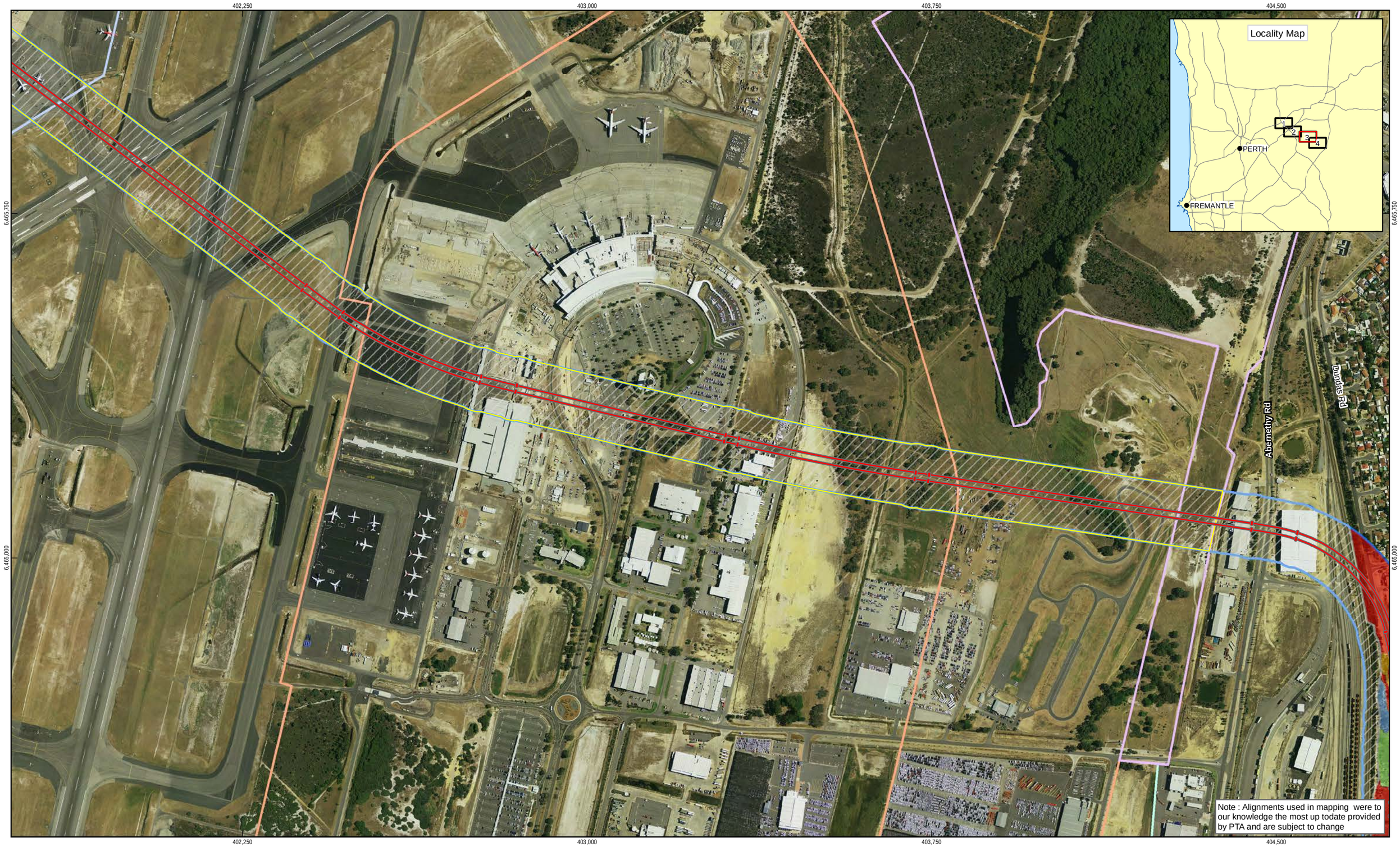

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
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N

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Option 2
Option 3
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Perth Airport Precinct Boundaries

Commercial Development
Conservation Areas
Runways and Taxiways
Terminal, Hangar and Aviation Support Development

Morgan (2013) survey area (not accessed)
Study Area

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Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number	61-29970
Revision	2
Date	20 Jan 2014

Sheet 3 of 4

Vegetation condition

Figure 5

G:\61\29970\GIS\Maps\Working\6129970_G001_Fig5_Rev2.mxd

Data source: PTA: Perth Airport Precinct Boundaries - 20131008, Options (1,2,3) - 20131009; Landgate: Metro Central 2013 Mosaic - 20121211, Roads - 20121211; GHD: Mattiske study area - 20131121, Study Area - 20131010, Vegetation Condition - 20131008, Morgan (2013) Survey Area -2013 ; GA: 250K Australian Topographic Series - 2006. Created by: vdinh

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403,750 404,500 405,250 406,000

6,465,000 6,464,250 6,463,500

Abernethy Rd

Dundas Rd

Maida Vale Rd

Poison Gully Creek

Locality Map

PERTH

FREMANTLE

1 2 3 4

Note : Alignments used in mapping were to our knowledge the most up todate provided by PTA and are subject to change

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
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N

Option 1
Option 2
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1-2
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Perth Airport Precinct Boundaries

Commercial Development
Conservation Areas
Runways and Taxiways
Terminal, Hangar and Aviation Support Development

Morgan (2013) survey area (not accessed)
Study Area

GHD

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Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number	61-29970
Revision	2
Date	20 Jan 2014

Sheet 4 of 4

Vegetation condition

Figure 5

G:\61\29970\GIS\Maps\Working\6129970_G001_Fig5_Rev2.mxd

Data source: PTA: Perth Airport Precinct Boundaries - 20131008, Options (1,2,3) - 20131009; Landgate: Metro Central 2013 Mosaic - 20121211, Roads - 20121211; GHD: Mattiske study area - 20131121, Study Area - 20131010, Vegetation Condition - 20131008, Morgan (2013) Survey Area -2013 ; GA: 250K Australian Topographic Series - 2006. Created by: vdinh

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398,000 399,000 400,000

6,468,000

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Bassendean Rd
Guildford Rd
River Rd
Tonkin Hwy
Dunstone Rd
Faunileroy Av
Swan River
Waterview Pde
Bonifay Av
Eastern Hwy

Locality Map
1
2
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4
PERTH
FREMANTLE

Note : Alignments used in mapping were to our knowledge the most up todate provided by PTA and are subject to change

Perth Airport Precinct Boundaries
- Commercial Development
- Conservation Areas
- Runways and Taxiways
- Terminal, Hangar and Aviation Support Development

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

Cockatoo survey
- *Corymbia calophylla*
- Dead
- *Eucalyptus camaldulensis*
- *Eucalyptus gomphocephala*
- *Eucalyptus marginata*
- *Eucalyptus rudis*
- *Eucalyptus rudis/camaldulensis*
- *Corymbia calophylla* (potential nest hollow)
- *Eucalyptus marginata* (potential nest hollow)
- *Eucalyptus rudis* (potential nest hollow)

Threatened fauna
- Black Cockatoo flying over study area (heard only)
- Black Cockatoo x 8
- Quenda
- Red-tail Black Cockatoo x 2
- Active reptile search
- Black Cockatoo in flight
- Option 1
- Option 2
- Option 3
- Drainage / stormwater channel
- Study Area
- Area not accessed
- Black cockatoo foraging, potential night roosting and breeding habitat
- Ephemeral / artificial water body
- Morgan (2013) survey area (not accessed)

Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number	61-29970
Revision	1
Date	20 Jan 2014

Fauna survey methods and results

Sheet 1 of 4

Figure 6

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399,000 400,000 401,000

6,467,000

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Waterview Rde

Boulder Av

Tonkin Hwy

Great Eastern Hwy

Station Rd

Locality Map

PERTH

FREMANTLE

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Perth Airport Precinct Boundaries
- Commercial Development
- Conservation Areas
- Runways and Taxiways
- Terminal, Hangar and Aviation Support Development

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
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- Area not accessed
- Black cockatoo foraging, potential night roosting and breeding habitat
- Ephemeral / artificial water body
- Morgan (2013) survey area (not accessed)

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Environmental Assessment

Job Number 61-29970
Revision 1
Date 20 Jan 2014

Fauna survey methods and results

Sheet 2 of 4

Figure 6

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Data source: PTA : Perth Airport Precinct Boundaries - 20131009; Landgate: Metro Central 2013 Mosaic - 20121211, Road Names - 20121211; GHD: Area not Accessed - 20131001, Black cockatoo foraging, potential night roosting and breeding habitat - 20131010, Ephemeral / artificial water body - 20131128, Option 1,2 3 - 20130422, Cockatoo survey - 20131007, Threatened fauna - 20131007, Active reptile search - 20131007, Drainage / storwater channel - 20131128, Study Area - 20131010, Black Cockatoo in flight - 20131128; GA: 250K Australian Topographic Series - 2006; . Created by: vdinh, erice

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au

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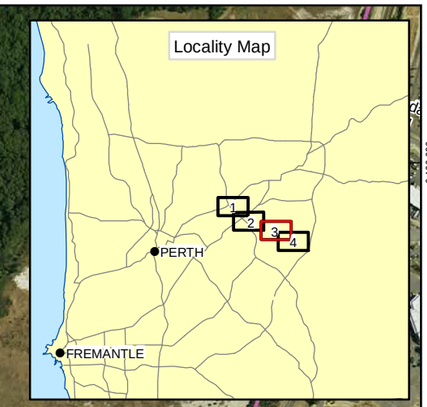

Abernethy Rd

Dundas Rd

Perth Airport Precinct Boundaries
- Commercial Development
- Conservation Areas
- Runways and Taxiways
- Terminal, Hangar and Aviation Support Development

Note : Alignments used in mapping were to our knowledge the most up todate provided by PTA and are subject to change

402,000 403,000 404,000

1:7,500 (at A3)

0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 50

N

Cockatoo survey
- *Corymbia calophylla*
- Dead
- *Eucalyptus camaldulensis*
- *Eucalyptus gomphocephala*
- *Eucalyptus marginata*
- *Eucalyptus rudis*
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- Option 3
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- Study Area
- Area not accessed
- Black cockatoo foraging, potential night roosting and breeding habitat
- Ephemeral / artificial water body
- Morgan (2013) survey area (not accessed)

Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number	61-29970
Revision	1
Date	20 Jan 2014

Fauna survey methods and results

Sheet 3 of 4

Figure 6

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Data source: PTA : Perth Airport Precinct Boundaries - 20131009; Landgate: Metro Central 2013 Mosaic - 20121211, Road Names - 20121211; GHD: Area not Accessed - 20131001, Black cockatoo foraging, potential night roosting and breeding habitat - 20131010, Ephemeral / artificial water body - 20131128, Option 1,2 3 - 20130422, Cockatoo survey - 20131007, Threatened fauna - 20131007, Active reptile search - 20131007, Drainage / storwater channel - 20131128, Study Area - 20131010, Black Cockatoo in flight - 20131128; GA: 250K Australian Topographic Series - 2006; . Created by: vdinh, erice

404,000 405,000 406,000

6,465,000

6,464,000

Locality Map

1 2 3 4

PERTH

FREMANTLE

Abernethy Rd

Dundas Rd

Maida Vale Rd

Roison Gully Creek

Perth Airport Precinct Boundaries

- Commercial Development
- Conservation Areas
- Runways and Taxiways
- Terminal, Hangar and Aviation Support Development

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0 37.5 75 150 225 300 375

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
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N

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- *Eucalyptus camaldulensis*
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- *Eucalyptus rudis/camaldulensis*
- *Corymbia calophylla* (potential nest hollow)
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- Red-tail Black Cockatoo x 2

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- Black Cockatoo in flight
- Option 1
- Option 2
- Option 3
- Drainage / stormwater channel

- Study Area
- Area not accessed
- Black cockatoo foraging, potential night roosting and breeding habitat
- Ephemeral / artificial water body
- Morgan (2013) survey area (not accessed)

Public Transport Authority
Forrestfield Airport Link
Environmental Assessment

Job Number	61-29970
Revision	1
Date	20 Jan 2014

Fauna survey methods and results

Sheet 4 of 4

Figure 6

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Appendix B — Desktop searches

Environmental Protection and Biodiversity Conservation Act 1990 (EPBC Act) search result

NatureMap flora search result

NatureMap fauna search result

Australian Government

Department of Sustainability, Environment, Water, Population and Communities

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.environment.gov.au/epbc/assessmentsapprovals/index.html

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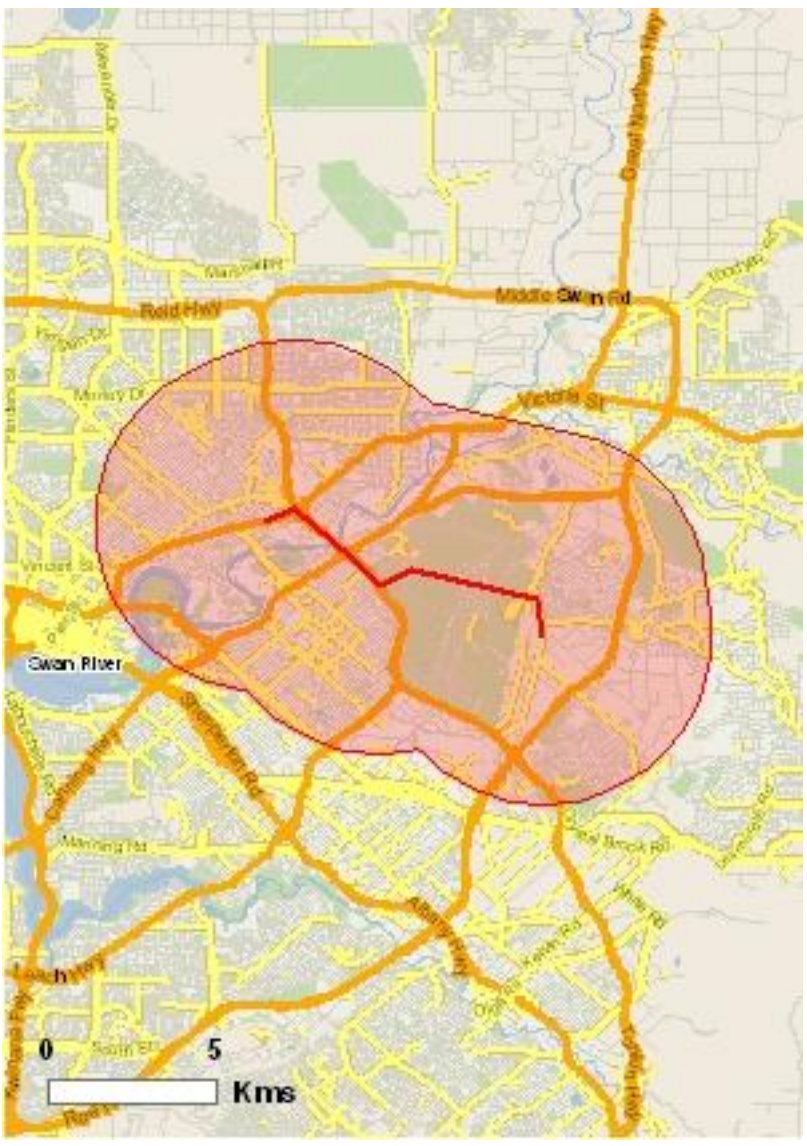
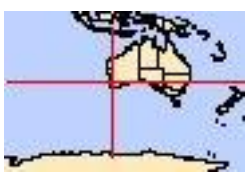


Coordinates

Buffer: 5.0Km



Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	3
Threatened Species:	34
Migratory Species:	12

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage/index.html

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at http://www.environment.gov.

Commonwealth Lands:	4
Commonwealth Heritage Places:	3
Listed Marine Species:	9
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

Place on the RNE:	58
State and Territory Reserves:	3
Regional Forest Agreements:	1
Invasive Species:	18
Nationally Important Wetlands:	2

Details

Matters of National Environmental Significance

Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Corymbia calophylla - Kingia australis woodlands on heavy soils of the Swan Coastal Plain	Endangered	Community known to occur within area
Claypans of the Swan Coastal Plain	Critically Endangered	Community likely to

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Shrublands and Woodlands of the eastern Swan Coastal Plain	Endangered	occur within area Community known to occur within area

Threatened Species

[Resource Information]

Name	Status	Type of Presence
BIRDS		
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo [67034]	Vulnerable	Species or species habitat may occur within area
Calyptorhynchus baudinii Baudin's Black-Cockatoo, Long-billed Black-Cockatoo [769]	Vulnerable	Roosting known to occur within area
Calyptorhynchus latirostris Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Breeding likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Vulnerable	Species or species habitat likely to occur within area
Sternula nereis nereis Fairy Tern (Australian) [82950]	Vulnerable	Species or species habitat known to occur within area
INSECTS		
Synemon gratiosa Graceful Sun Moth [66757]	Endangered	Species or species habitat may occur within area
MAMMALS		
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Phascogale calura Red-tailed Phascogale [316]	Endangered	Species or species habitat may occur within area
Setonix brachyurus Quokka [229]	Vulnerable	Species or species habitat may occur within area
PLANTS		
Acacia anomala Grass Wattle, Chittering Grass Wattle [8153]	Vulnerable	Species or species habitat likely to occur within area
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat likely to occur within area
Banksia mimica Summer Honeypot [82765]	Endangered	Species or species habitat likely to occur within area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat likely to occur within area
Calytrix breviseta subsp. breviseta Swamp Starflower [23879]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Centrolepis caespitosa [6393]	Endangered	Species or species habitat likely to occur within area
Chamelaucium sp. Gingin (N.G.Marchant 6) Gingin Wax [64649]	Endangered	Species or species habitat may occur within area
Conospermum undulatum Wavy-leaved Smokebush [24435]	Vulnerable	Species or species habitat likely to occur within area
Darwinia foetida Muchea Bell [83190]	Critically Endangered	Species or species habitat likely to occur within area
Epiblema grandiflorum var. cyaneum Baby Blue Orchid, Blue Babe-in-the-cradle Orchid, Blue Babe-in-a-cradle [67182]	Endangered	Species or species habitat may occur within area
Eucalyptus balanites Cadda Road Mallee, Cadda Mallee [24264]	Endangered	Species or species habitat may occur within area
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat may occur within area
Hydatella dioica One-sexed Hydatella [4898]	Endangered	Species or species habitat likely to occur within area
Lasiopetalum pterocarpum Wing-fruited Lasiopetalum [64922]	Endangered	Species or species habitat may occur within area
Lepidosperma rostratum Beaked Lepidosperma [14152]	Endangered	Species or species habitat likely to occur within area
Macarthuria keigheryi Keighery's Macarthuria [64930]	Endangered	Species or species habitat likely to occur within area
Synaphea sp. Fairbridge Farm (D.Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat may occur within area
Thelymitra manginii K.Dixon & Batty ms. [67443]	Endangered	Species or species habitat likely to occur within area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat likely to occur within area
Verticordia fimbrilepis subsp. fimbrilepis Shy Featherflower [24631]	Endangered	Species or species habitat may occur within area
Villarsia calthifolia Mountain Villarsia [10886]	Endangered	Species or species habitat likely to occur within area
REPTILES		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat may occur within area

Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Ardea alba](#) Great Egret, White Egret [59541]		Species or species habitat may occur within area
[Ardea ibis](#) Cattle Egret [59542]		Species or species habitat may occur within area
Migratory Marine Species		
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat may occur within area
Migratory Terrestrial Species		
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
[Leipoa ocellata](#) Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
[Ardea alba](#) Great Egret, White Egret [59541]		Species or species habitat may occur within area
[Ardea ibis](#) Cattle Egret [59542]		Species or species habitat may occur within area
[Rostratula benghalensis (sensu lato)](#) Painted Snipe [889]	Vulnerable*	Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Defence - BUSHMEAD RIFLE RANGE

Name
Defence - BUSHMEAD TRAINING AREA
Defence - PALMER BARRACKS - SOUTH GUILDFORD

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Natural		
Forrestfield Bushland	WA	Indicative Place
Munday Swamp and Surrounding Bushland	WA	Indicative Place
Historic		
Inglewood Post Office	WA	Listed place

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Vulnerable*	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat may occur within area

Extra Information

Places on the RNE [Resource Information]

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
Midgegooroo and Kalleep Munday Heritage Precincts	WA	Indicative Place
Swan River Foreshore, Maylands	WA	Indicative Place
Bushmead Rifle Range Area	WA	Registered
Bushmead Rifle Range Commonwealth Area	WA	Registered
Forrestfield Bushland	WA	Registered

Name	State	Status
Munday Swamp Bushland	WA	Registered
Munday Swamp and Surrounding Bushland	WA	Registered
Historic		
Albany Bell Hatchery (former)	WA	Indicative Place
City of Bayswater Administration Centre	WA	Indicative Place
Daylesford House	WA	Indicative Place
Earlsferry House and Grounds	WA	Indicative Place
East Perth Power Station (former)	WA	Indicative Place
Halliday House	WA	Indicative Place
Independent Chapel (former)	WA	Indicative Place
Maylands Aerodrome (former) Precinct	WA	Indicative Place
Maylands Brickworks Group	WA	Indicative Place
Old Bristile Kilns	WA	Indicative Place
Royal West Australian Institute for the Blind Building	WA	Indicative Place
Walcott Centre	WA	Indicative Place
Wiinschl Residence and Surrounds	WA	Indicative Place
Albany Bell Castle Buildings	WA	Registered
Barkers Warehouse (former)	WA	Registered
Bebo Moro (former)	WA	Registered
Brockman House (former)	WA	Registered
Building	WA	Registered
Building	WA	Registered
Chateau Guildford	WA	Registered
Courthouse and Gaol (former)	WA	Registered
Crossland House (former)	WA	Registered
Fairholme	WA	Registered
Fairholme Servants Quarters	WA	Registered
Foothills School	WA	Registered
Garden Hill (former)	WA	Registered
Garrick Theatre	WA	Registered
Guildford Conservation Area	WA	Registered
Guildford Historic Town	WA	Registered
Guildford Post Office	WA	Registered
Guildford Tavern	WA	Registered
House	WA	Registered
House	WA	Registered
House and former Bakery	WA	Registered
Johnsons Mill	WA	Registered
Kings House and Shop	WA	Registered
Lieutenant Du Canes House and Stables	WA	Registered
Liverpool Arms Hotel (former)	WA	Registered
Mechanics Institute (former)	WA	Registered
Moultons Cottage	WA	Registered
Nulsen Haven	WA	Registered
Padbury Stores (former)	WA	Registered
Peninsula Hotel (former)	WA	Registered
Pensioners Cottage (former)	WA	Registered
Primary School	WA	Registered
Rose and Crown Hotel	WA	Registered
St Matthews Anglican Church	WA	Registered
Town Hall and Council Offices (former)	WA	Registered
Tranby House	WA	Registered
Welbourne House	WA	Registered
Wesley Chapel	WA	Registered

State and Territory Reserves [Resource Information]

Name	State
Unnamed WA29815	WA
Unnamed WA37997	WA
Unnamed WA49079	WA

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit,

Name	Status	Type of Presence
Mammals		
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat may occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Perth Airport Woodland Swamps	WA
Swan-Canning Estuary	WA

Coordinates

-31.924636 115.91772,-31.921134 115.926096,-31.933621 115.941172,-31.941388 115.948634,-31.937581 115.957467,-31.945043 115.991579,-31.955093 115.992797

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia

-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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NatureMap
Mapping Western Australia's biodiversity

NatureMap Flora Species Report 5 km

Created By Guest user on 28/11/2012

Kingdom Plantae
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'
Group By Family

Family	Species	Records
Alstroemeriaceae	1	1
Amaranthaceae	7	13
Anacardiaceae	1	3
Anarthriaceae	2	18
Apiaceae	16	39
Apocynaceae	1	1
Araceae	4	9
Araliaceae	6	13
Asparagaceae	27	107
Asphodelaceae	1	2
Asteraceae	58	128
Boraginaceae	3	8
Brassicaceae	7	12
Bryaceae	6	9
Byblidaceae	1	11
Campanulaceae	8	22
Cannaceae	2	5
Caprifoliaceae	1	1
Caryophyllaceae	4	5
Casuarinaceae	3	24
Celastraceae	2	8
Centrolepidaceae	7	18
Chenopodiaceae	10	20
Colchicaceae	4	19
Commelinaceae	1	4
Convolvulaceae	2	10
Crassulaceae	6	17
Cupressaceae	1	1
Cyperaceae	65	150
Dasypogonaceae	4	21
Dennstaedtiaceae	1	1
Dicranaceae	3	4
Dilleniaceae	14	55
Dioscoreaceae	1	1
Ditrichaceae	1	1
Droseraceae	20	62
Elaeocarpaceae	3	10
Elatinaceae	1	2
Ericaceae	27	102
Euphorbiaceae	9	17
Fabaceae	112	416
Fissidentaceae	1	1
Funariaceae	1	1
Gentianaceae	2	3
Geraniaceae	3	6
Goodeniaceae	23	77
Gracilariaceae	1	1
Haemodoraceae	33	163
Haloragaceae	10	29
Hemerocallidaceae	13	46
Hydatellaceae	2	3
Hydrocharitaceae	3	4
Hypericaceae	1	2
Hypoxidaceae	2	2
Iridaceae	20	50
Juncaceae	9	14
Juncaginaceae	4	7
Lamiaceae	9	22
Lauraceae	5	7
Lentibulariaceae	5	19
Linaceae	2	2
Loganiaceae	1	1
Loranthaceae	3	3
Lythraceae	1	1
Malvaceae	10	34
Marsileaceae	2	4
Menyanthaceae	4	6
Molluginaceae	3	24
Moraceae	1	1
Myrtaceae	71	254
Olacaceae	2	7
Onagraceae	4	5
Orchidaceae	62	163
Orobanchaceae	1	1
Oxalidaceae	5	10
Papaveraceae	3	3
Philydraceae	2	4
Phyllanthaceae	3	6
Phytolaccaceae	1	1

Pittosporaceae	2	9
Plantaginaceae	7	11
Poaceae	67	121
Polygalaceae	4	11
Polygonaceae	4	8
Portulacaceae	1	2
Potamogetonaceae	1	4
Pottiaceae	3	7
Primulaceae	3	3
Proteaceae	75	471
Pteridaceae	2	5
Ranunculaceae	3	5
Restionaceae	21	74
Rhamnaceae	6	13
Rosaceae	2	3
Rubiaceae	1	2
Rutaceae	5	23
Salicaceae	2	7
Salviniaceae	1	1
Santalaceae	1	3
Schizaeaceae	1	1
Scrophulariaceae	3	3
Selaginellaceae	1	2
Sematophyllaceae	1	2
Solanaceae	10	27
Stylidiaceae	33	110
Tecophilaeaceae	1	2
Thymelaeaceae	6	16
Tropaeolaceae	1	2
Typhaceae	1	1
Verbenaceae	2	2
Violaceae	1	7
Xanthorrhoeaceae	2	4
Zamiaceae	1	1
TOTAL	**1056**	**3320**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Alstroemeriaceae					
1.	20755	*Alstroemeria psittacina*	Y		
Amaranthaceae					
2.	2648	*Alternanthera denticulata (Lesser Joyweed)*			
3.	2668	*Amaranthus powellii (Powell's Amaranth)*	Y		
4.	2716	*Ptilotus declinatus (Curved Mulla Mulla)*			
5.	11260	*Ptilotus drummondii var. drummondii (Pussytail)*			
6.	11797	*Ptilotus drummondii var. minor*			
7.	2720	*Ptilotus esquamatus*			
8.	2742	*Ptilotus manglesii (Pom Poms)*			
Anacardiaceae					
9.	11027	*Schinus terebinthifolius*	Y		
Anarthriaceae					
10.	1097	*Lyginia barbata*			
11.	18049	*Lyginia imberbis*			
Apiaceae					
12.	6205	*Actinotus leucocephalus (Flannel Flower)*			
13.	12040	*Apium prostratum var. prostratum (Sea Celery)*			
14.	6214	*Centella asiatica*			
15.	6218	*Daucus glochidiatus (Australian Carrot)*			
16.	6219	*Eryngium pinnatifidum (Blue Devils)*			
17.	14720	*Eryngium subdecumbens*		P3	
18.	6221	*Foeniculum vulgare (Fennel)*	Y		
19.	6222	*Homalosciadium homalocarpum*			
20.	6245	*Pentapeltis peltigera*			
21.	6249	*Platysace compressa (Tapeworm Plant)*			
22.	6253	*Platysace filiformis*			
23.	6255	*Platysace juncea*			
24.	11132	*Platysace ramosissima*		P3	
25.	6263	*Schoenolaena juncea*			
26.	6284	*Xanthosia candida*			
27.	6289	*Xanthosia huegelii*			
Apocynaceae					
28.	6587	*Gomphocarpus fruticosus (Narrowleaf Cottonbush)*	Y		
Araceae					
29.	32999	*Colocasia esculenta var. esculenta*	Y		
30.	28342	*Landoltia punctata (Thin Duckweed)*			
31.	1051	*Lemna disperma (Duckweed)*			
32.	1049	*Zantedeschia aethiopica (Arum Lily)*	Y		
Araliaceae					
33.	6226	*Hydrocotyle callicarpa (Small Pennywort)*			
34.	6229	*Hydrocotyle diantha*			
35.	6233	*Hydrocotyle lemnoides (Aquatic Pennywort)*		P4	
36.	11074	*Hydrocotyle striata*		P1	
37.	19041	*Trachymene coerulea subsp. coerulea*			
38.	6280	*Trachymene pilosa (Native Parsnip)*			
Asparagaceae					
39.	11299	*Chamaescilla corymbosa var. corymbosa*			
40.	8788	*Chamaescilla versicolor*			
41.	1287	*Dichopogon capillipes*			
42.	11815	*Laxmannia grandiflora subsp. grandiflora*			
43.	11911	*Laxmannia ramosa subsp. ramosa*			
44.	11464	*Laxmannia sessiliflora subsp. australis*			
45.	1309	*Laxmannia squarrosa*			
46.	1223	*Lomandra caespitosa (Tufted Mat Rush)*			
47.	1228	*Lomandra hermaphrodita*			
48.	14542	*Lomandra micrantha subsp. micrantha*			
49.	1234	*Lomandra nigricans*			
50.	1236	*Lomandra odora (Tiered Matrush)*			
51.	1239	*Lomandra preissii*			
52.	1243	*Lomandra sericea (Silky Mat Rush)*			
53.	1245	*Lomandra spartea*			
54.	1312	*Sowerbaea laxiflora (Purple Tassels)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
55.	1317	*Thysanotus anceps*		P3	
56.	1318	*Thysanotus arbuscula*			
57.	1319	*Thysanotus arenarius*			
58.	1330	*Thysanotus fastigiatus*			
59.	1338	*Thysanotus manglesianus (Fringed Lily)*			
60.	1339	*Thysanotus multiflorus (Many-flowered Fringe Lily)*			
61.	1343	*Thysanotus patersonii*			
62.	1351	*Thysanotus sparteus*			
63.	1354	*Thysanotus tenellus*			
64.	1357	*Thysanotus thyrsoideus*			
65.	1358	*Thysanotus triandrus*			
Asphodelaceae					
66.	1364	*Asphodelus fistulosus (Onion Weed)*	Y		
Asteraceae					
67.	7838	*Arctotheca calendula (Cape Weed)*	Y		
68.	7867	*Brachyscome bellidioides*			
69.	7875	*Brachyscome glandulosa*			
70.	7878	*Brachyscome iberidifolia*			
71.	7883	*Brachyscome pusilla*			
72.	7925	*Chondrilla juncea (Skeleton Weed)*	Y		
73.	7935	*Cichorium intybus (Chicory)*	Y		
74.	7937	*Cirsium vulgare (Spear Thistle)*	Y		
75.	7939	*Conyza bonariensis (Flaxleaf Fleabane)*	Y		
76.	20074	*Conyza sumatrensis*	Y		
77.	7943	*Cotula australis (Common Cotula)*			
78.	7945	*Cotula coronopifolia (Waterbuttons)*	Y		
79.	7946	*Cotula cotuloides (Smooth Cotula)*			
80.	7947	*Cotula turbinata (Funnel Weed)*	Y		
81.	13354	*Craspedia variabilis*			
82.	7953	*Crepis foetida (Foetid Hawksbeard)*	Y		
83.	7961	*Dittrichia graveolens (Stinkwort)*	Y		
84.	8450	*Eclipta prostrata*	Y		
85.	15137	*Euchiton sphaericus*			
86.	8002	*Gnephosis tenuissima*			
87.	8007	*Hedypnois rhagadioloides (Cretan Weed)*	Y		
88.	8027	*Helichrysum macranthum*			
89.	12741	*Hyalosperma cotula*			
90.	9352	*Hypochaeris radicata (Flat Weed)*	Y		
91.	8095	*Lactuca saligna (Wild Lettuce)*	Y		
92.	18585	*Lagenophora huegelii*			
93.	8105	*Millotia myosotidifolia*			
94.	8106	*Millotia tenuifolia (Soft Millotia)*			
95.	14344	*Millotia tenuifolia var. tenuifolia (Soft Millotia)*			
96.	29418	*Monoculus monstrosus*	Y		
97.	8143	*Olearia paucidentata (Autumn Scrub Daisy)*			
98.	8175	*Podolepis gracilis (Slender Podolepis)*			
99.	8177	*Podolepis lessonii*			
100.	8182	*Podotheca angustifolia (Sticky Longheads)*			
101.	8183	*Podotheca chrysantha (Yellow Podotheca)*			
102.	13255	*Pterochaeta paniculata*			
103.	13300	*Rhodanthe citrina*			
104.	15035	*Rhodanthe corymbosa*			
105.	13309	*Rhodanthe spicata*			
106.	8205	*Senecio gilbertii*		P1	
107.	20663	*Senecio multicaulis subsp. multicaulis*			
108.	20161	*Senecio pinnatifolius*			
109.	8220	*Senecio vulgaris (Common Groundsel)*	Y		
110.	8224	*Siloxerus filifolius*			
111.	8225	*Siloxerus humifusus (Procumbent Siloxerus)*			
112.	8228	*Solidago canadensis (Goldenrod)*	Y		
113.	8231	*Sonchus oleraceus (Common Sowthistle)*	Y		
114.	25902	*Symphyotrichum squamatum (Bushy Starwort)*	Y		
115.	8243	*Tagetes minuta (Stinking Roger)*	Y		
116.	8245	*Taraxacum officinale (Dandelion)*	Y		
117.	8250	*Tragopogon porrifolius (Salsify)*	Y		
118.	8251	*Trichocline spathulata (Native Gerbera)*			
119.	38388	*Ursinia anthemoides subsp. anthemoides*	Y		
120.	8257	*Vellereophyton dealbatum (White Cudweed)*	Y		
121.	15725	*Verbesina encelioides*	Y		

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122.	8282	*Waitzia suaveolens (Fragrant Waitzia)*			
123.	13333	*Waitzia suaveolens var. suaveolens*			
124.	8287	*Xanthium spinosum (Bathurst Burr)*	Y		
Boraginaceae					
125.	6681	*Echium plantagineum (Paterson's Curse)*	Y		
126.	6686	*Halgania corymbosa*		P3	
127.	29716	*Halgania sp. Wongan Hills (K.F. Kenneally 2393)*			
Brassicaceae					
128.	2995	*Brassica napus*	Y		
129.	3011	*Diplotaxis muralis (Wall Rocket)*	Y		
130.	3016	*Heliophila pusilla*	Y		
131.	19989	*Lepidium didymum*	Y		
132.	3061	*Raphanus raphanistrum (Wild Radish)*	Y		
133.	3062	*Raphanus sativus (Radish)*	Y		
134.	3066	*Rorippa nasturtium-aquaticum (Watercress)*	Y		
Bryaceae					
135.	32376	*Gemmabryum dichotomum*			
136.	32380	*Gemmabryum pachythecum*			
137.	32417	*Ptychostomum angustifolium*			
138.	32424	*Rosulabryum albolimbatum*			
139.	32425	*Rosulabryum billarderi*			
140.	32432	*Schizymenium bryoides*			
Byblidaceae					
141.	3178	*Byblis gigantea (Rainbow Plant)*		P3	
Campanulaceae					
142.	7396	*Isotoma hypocrateriformis (Woodbridge Poison)*			
143.	7398	*Isotoma pusilla (Small Isotome)*			
144.	7403	*Lobelia heterophylla (Wing-seeded Lobelia)*			
145.	7406	*Lobelia rhombifolia (Tufted Lobelia)*			
146.	7407	*Lobelia rhytidosperma (Wrinked-seeded Lobelia)*			
147.	7410	*Monopsis debilis*	Y		
148.	7384	*Wahlenbergia capensis (Cape Bluebell)*	Y		
149.	7389	*Wahlenbergia preissii*			
Cannaceae					
150.	13488	*Canna x generalis*	Y		
151.	1571	*Canna x orchiodes*	Y		
Caprifoliaceae					
152.	35322	*Centranthus ruber subsp. ruber*	Y		
Caryophyllaceae					
153.	19825	*Petrorhagia dubia*	Y		
154.	2905	*Polycarpon tetraphyllum (Fourleaf Allseed)*	Y		
155.	2909	*Silene gallica (French Catchfly)*	Y		
156.	15972	*Silene gallica var. gallica*	Y		
Casuarinaceae					
157.	1728	*Allocasuarina fraseriana (Sheoak)*			
158.	1732	*Allocasuarina humilis (Dwarf Sheoak)*			
159.	1742	*Casuarina obesa (Swamp Sheoak)*			
Celastraceae					
160.	4733	*Stackhousia monogyna*			
161.	4737	*Tripterococcus brunonis (Winged Stackhousia)*			
Centrolepidaceae					
162.	1116	*Aphelia brizula*			
163.	1117	*Aphelia cyperoides*			
164.	1121	*Centrolepis aristata (Pointed Centrolepis)*			
165.	1125	*Centrolepis drummondiana*			
166.	1129	*Centrolepis glabra (Smooth Centrolepis)*			
167.	1131	*Centrolepis inconspicua*			
168.	1132	*Centrolepis mutica*			
Chenopodiaceae					
169.	2462	*Atriplex hypoleuca*			
170.	2471	*Atriplex prostrata (Hastate Orache)*	Y		
171.	33500	*Dysphania ambrosioides (Mexican Tea)*	Y		
172.	11368	*Dysphania glomulifera subsp. glomulifera*			
173.	2593	*Sarcocornia quinqueflora (Beaded Samphire)*			

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174.	2639	*Suaeda australis (Seablite)*			
175.	33236	*Tecticornia halocnemoides (Shrubby Samphire)*			
176.	33237	*Tecticornia halocnemoides subsp. halocnemoides*			
177.	33319	*Tecticornia indica subsp. bidens*			
178.	31718	*Tecticornia lepidosperma*			
Colchicaceae					
179.	1382	*Baeometra uniflora*	Y		
180.	12770	*Burchardia congesta*			
181.	1385	*Burchardia multiflora (Dwarf Burchardia)*			
182.	12072	*Wurmbea dioica subsp. alba*			
Commelinaceae					
183.	1162	*Cartonema philydroides*			
Convolvulaceae					
184.	6620	*Ipomoea cairica (Coast Morning Glory)*	Y		
185.	6630	*Ipomoea indica (Morning Glory)*	Y		
Crassulaceae					
186.	11709	*Crassula colorata var. acuminata*			
187.	11563	*Crassula colorata var. colorata*			
188.	3138	*Crassula decumbens (Rufous Stonecrop)*			
189.	11349	*Crassula decumbens var. decumbens*			
190.	3139	*Crassula exserta*			
191.	15706	*Crassula natans var. minus*	Y		
Cupressaceae					
192.	36520	*Callitris acuminata (Dwarf Cypress)*			
Cyperaceae					
193.	740	*Baumea arthrophylla*			
194.	741	*Baumea articulata (Jointed Rush)*			
195.	15836	*Baumea preissii subsp. preissii*			
196.	747	*Baumea rubiginosa*			
197.	748	*Baumea vaginalis (Sheath Twigrush)*			
198.	749	*Bolboschoenus caldwellii (Marsh Club-rush)*			
199.	14535	*Bolboschoenus medianus*		P1	
200.	753	*Carex appressa (Tall Sedge)*			
201.	755	*Carex fascicularis (Tassel Sedge)*			
202.	756	*Carex inversa (Knob Sedge)*			
203.	760	*Caustis dioica*			
204.	763	*Chorizandra enodis (Black Bristlerush)*			
205.	768	*Cyathochaeta avenacea*			
206.	769	*Cyathochaeta clandestina*			
207.	17618	*Cyathochaeta equitans*			
208.	16245	*Cyathochaeta teretifolia*		P3	
209.	776	*Cyperus brevifolius (Kyllinga Weed)*	Y		
210.	792	*Cyperus eragrostis (Umbrella Sedge)*	Y		
211.	806	*Cyperus polystachyos (Bunchy Sedge)*	Y		
212.	815	*Cyperus tenellus (Tiny Flatsedge)*	Y		
213.	816	*Cyperus tenuiflorus (Scaly Sedge)*	Y		
214.	20216	*Ficinia nodosa (Knotted Club Rush)*			
215.	894	*Fimbristylis velata*			
216.	902	*Gahnia decomposita*			
217.	907	*Gahnia trifida (Coast Saw-sedge)*			
218.	914	*Isolepis hookeriana (Bristle Club Rush)*			
219.	917	*Isolepis marginata (Coarse Club-rush)*	Y		
220.	10831	*Isolepis prolifera (Budding Club-rush)*	Y		
221.	924	*Isolepis stellata (Star Club-rush)*			
222.	925	*Lepidosperma angustatum*			
223.	930	*Lepidosperma costale*			
224.	931	*Lepidosperma drummondii*			
225.	936	*Lepidosperma leptostachyum*			
226.	937	*Lepidosperma longitudinale (Pithy Sword-sedge)*			
227.	940	*Lepidosperma pubisquameum*			
228.	944	*Lepidosperma scabrum*			
229.	945	*Lepidosperma squamatum*			
230.	955	*Mesomelaena pseudostygia*			
231.	957	*Mesomelaena tetragona (Semaphore Sedge)*			
232.	968	*Schoenoplectus pungens (Sharpleaf Rush)*			
233.	969	*Schoenoplectus validus (Lake Club-rush)*			
234.	971	*Schoenus andrewsii*			

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235.	975	*Schoenus bifidus*			
236.	978	*Schoenus brevisetis*			
237.	979	*Schoenus caespititius*			
238.	984	*Schoenus curvifolius*			
239.	986	*Schoenus efoliatus*			
240.	987	*Schoenus elegans*			
241.	991	*Schoenus grammatophyllus*			
242.	17606	*Schoenus griffinianus*		P3	
243.	996	*Schoenus laevigatus*			
244.	998	*Schoenus latitans*			
245.	1002	*Schoenus nanus (Tiny Bog Rush)*			
246.	1007	*Schoenus pedicellatus*			
247.	1008	*Schoenus pennisetis*		P1	
248.	1013	*Schoenus sculptus (Gimlet Bog-rush)*			
249.	1016	*Schoenus subbarbatus (Bearded Bog-rush)*			
250.	1017	*Schoenus subbulbosus*			
251.	1018	*Schoenus subfascicularis*			
252.	1019	*Schoenus subflavus (Yellow Bog-rush)*			
253.	1020	*Schoenus sublateralis*			
254.	1026	*Schoenus unispiculatus*			
255.	1034	*Tetraria capillaris (Hair Sedge)*			
256.	1036	*Tetraria octandra*			
257.	1038	*Tricostularia neesii*			
Dasypogonaceae					
258.	19309	*Calectasia narragara*			
259.	1218	*Dasypogon bromeliifolius (Pineapple Bush)*			
260.	1220	*Dasypogon obliquifolius*			
261.	1221	*Kingia australis (Kingia)*			
Dennstaedtiaceae					
262.	57	*Pteridium esculentum (Bracken)*			
Dicranaceae					
263.	32460	*Campylopus acuminatus var. kirkii*			
264.	32461	*Campylopus bicolor var. bicolor*			
265.	32338	*Campylopus introflexus*	Y		
Dilleniaceae					
266.	5109	*Hibbertia amplexicaulis*			
267.	5112	*Hibbertia aurea*			
268.	5114	*Hibbertia commutata*			
269.	20051	*Hibbertia diamesogenos*			
270.	19778	*Hibbertia glomerata subsp. darlingensis*			
271.	5134	*Hibbertia huegelii*			
272.	5135	*Hibbertia hypericoides (Yellow Buttercups)*			
273.	5150	*Hibbertia nymphaea*			
274.	5152	*Hibbertia ovata*			
275.	5154	*Hibbertia perfoliata*			
276.	5162	*Hibbertia racemosa (Stalked Guinea Flower)*			
277.	5169	*Hibbertia serrata (Serrate Leaved Guinea Flower)*			
278.	5172	*Hibbertia stellaris (Orange Stars)*			
279.	5173	*Hibbertia subvaginata*			
Dioscoreaceae					
280.	1509	*Dioscorea hastifolia (Warrine)*			
Ditrichaceae					
281.	32347	*Ditrichum difficile*			
Droseraceae					
282.	13204	*Drosera callistos*			
283.	3095	*Drosera erythrorhiza (Red Ink Sundew)*			
284.	13217	*Drosera erythrorhiza subsp. erythrorhiza*			
285.	15453	*Drosera gigantea subsp. gigantea*			
286.	3098	*Drosera glanduligera (Pimpernel Sundew)*			
287.	3101	*Drosera heterophylla (Swamp Rainbow)*			
288.	14298	*Drosera macrantha subsp. macrantha*			
289.	11853	*Drosera menziesii subsp. menziesii*			
290.	13216	*Drosera menziesii subsp. penicillaris*			
291.	3114	*Drosera nitidula (Shining Sundew)*			
292.	3117	*Drosera paleacea (Dwarf Sundew)*			
293.	13188	*Drosera paleacea subsp. paleacea*			
294.	3118	*Drosera pallida (Pale Rainbow)*			

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295.	3119	*Drosera parvula (Small Sundew)*			
296.	3123	*Drosera platystigma (Black-eyed Sundew)*			
297.	29178	*Drosera porrecta*			
298.	3124	*Drosera pulchella (Pretty Sundew)*			
299.	8911	*Drosera rosulata*			
300.	3131	*Drosera stolonifera (Leafy Sundew)*			
301.	3135	*Drosera zonaria (Painted Sundew)*			
Elaeocarpaceae					
302.	4524	*Platytheca galioides*			
303.	4535	*Tetratheca hirsuta (Black Eyed Susan)*			
304.	4537	*Tetratheca nuda*			
Elatinaceae					
305.	5187	*Elatine gratioloides (Waterwort)*			
Ericaceae					
306.	6311	*Andersonia heterophylla*			
307.	6314	*Andersonia lehmanniana*			
308.	11471	*Andersonia lehmanniana subsp. lehmanniana*			
309.	6323	*Astroloma ciliatum (Candle Cranberry)*			
310.	6327	*Astroloma foliosum (Candle Cranberry)*			
311.	6330	*Astroloma macrocalyx (Swan Berry)*			
312.	6334	*Astroloma pallidum (Kick Bush)*			
313.	6337	*Astroloma stomarrhena (Red Swamp Cranberry)*			
314.	6339	*Astroloma xerophyllum*			
315.	6347	*Conostephium minus (Pink-tipped Pearl flower)*			
316.	6348	*Conostephium pendulum (Pearl Flower)*			
317.	6349	*Conostephium preissii*			
318.	6360	*Leucopogon australis (Spiked Beard-heath)*			
319.	6374	*Leucopogon conostephioides*			
320.	6397	*Leucopogon glaucifolius*			
321.	6402	*Leucopogon hirsutus*			
322.	6427	*Leucopogon parviflorus (Coast Beard-heath)*			
323.	6434	*Leucopogon polymorphus*			
324.	6439	*Leucopogon pulchellus (Beard-heath)*			
325.	6440	*Leucopogon racemulosus*			
326.	28311	*Leucopogon sp. Great Southern (R.S. Cowan A 586)*			
327.	19579	*Leucopogon sp. Murdoch (M. Hislop 1037)*			
328.	6444	*Leucopogon sprengelioides*			
329.	40803	*Leucopogon squarrosus subsp. squarrosus*			
330.	6456	*Lysinema ciliatum (Curry Flower)*			
331.	34736	*Lysinema pentapetalum*			
332.	6476	*Styphelia tenuiflora (Common Pinheath)*			
Euphorbiaceae					
333.	4626	*Euphorbia drummondii (Caustic Weed)*			
334.	29940	*Euphorbia maculata*	Y		
335.	4648	*Euphorbia terracina (Geraldton Carnation Weed)*	Y		
336.	4662	*Monotaxis grandiflora (Diamond of the Desert)*			
337.	19585	*Monotaxis grandiflora var. grandiflora*			
338.	4666	*Monotaxis occidentalis*			
339.	4705	*Ricinus communis (Castor Oil Plant)*	Y		
340.	4713	*Stachystemon axillaris (Leafy Stachystemon)*			
341.	4716	*Stachystemon vermicularis*			
Fabaceae					
342.	3219	*Acacia anomala (Grass Wattle)*		T	
343.	15466	*Acacia applanata*			
344.	3231	*Acacia auronitens*			
345.	3294	*Acacia dentifera*			
346.	3323	*Acacia ericifolia*			
347.	3331	*Acacia extensa (Wiry Wattle)*			
348.	3374	*Acacia huegelii*			
349.	3382	*Acacia incrassata*			
350.	11611	*Acacia lasiocarpa var. lasiocarpa*			
351.	15721	*Acacia lasiocarpa var. sedifolia*			
352.	3454	*Acacia nervosa (Rib Wattle)*			
353.	3482	*Acacia paradoxa (Kangaroo Thorn)*	Y		
354.	15481	*Acacia pulchella var. glaberrima*			
355.	15483	*Acacia pulchella var. pulchella*			
356.	3504	*Acacia pycnantha (Golden Wattle)*	Y		
357.	3527	*Acacia saligna (Orange Wattle)*			

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358.	30032	*Acacia saligna subsp. saligna*			
359.	3541	*Acacia sessilis*			
360.	3557	*Acacia stenoptera (Narrow Winged Wattle)*			
361.	3574	*Acacia teretifolia*			
362.	3602	*Acacia willdenowiana (Grass Wattle)*			
363.	3686	*Aotus cordifolia*			
364.	3688	*Aotus gracillima*			
365.	3692	*Aotus procumbens*			
366.	3710	*Bossiaea eriocarpa (Common Brown Pea)*			
367.	3714	*Bossiaea ornata (Broad Leaved Brown Pea)*			
368.	18156	*Chamaecytisus palmensis (Tagasaste)*	Y		
369.	3753	*Chorizema dicksonii (Yellow-eyed Flame Pea)*			
370.	35838	*Cristonia biloba subsp. biloba*			
371.	17368	*Crotalaria agatiflora subsp. agatiflora*	Y		
372.	3793	*Daviesia angulata*			
373.	3799	*Daviesia cordata (Bookleaf)*			
374.	3805	*Daviesia decurrens (Prickly Bitter-pea)*			
375.	19747	*Daviesia decurrens subsp. decurrens*			
376.	3807	*Daviesia divaricata (Marno)*			
377.	18560	*Daviesia divaricata subsp. divaricata*			
378.	3815	*Daviesia horrida (Prickly Bitter-pea)*			
379.	3824	*Daviesia nudiflora*			
380.	16585	*Daviesia nudiflora subsp. nudiflora*			
381.	3831	*Daviesia pedunculata*			
382.	3832	*Daviesia physodes*			
383.	3833	*Daviesia podophylla*			
384.	3834	*Daviesia polyphylla*			
385.	3845	*Daviesia triflora*			
386.	3872	*Euchilopsis linearis (Swamp Pea)*			
387.	3880	*Eutaxia virgata*			
388.	3895	*Gastrolobium calycinum (York Road Poison)*			
389.	20475	*Gastrolobium capitatum*			
390.	20505	*Gastrolobium celsianum*			
391.	20513	*Gastrolobium dilatatum*			
392.	20473	*Gastrolobium ebracteolatum*			
393.	20483	*Gastrolobium linearifolium*			
394.	3912	*Gastrolobium oxylobioides (Champion Bay Poison)*			
395.	3923	*Gastrolobium spathulatum (Poison Bush)*			
396.	3933	*Gastrolobium villosum (Crinkle-leaved Poison)*			
397.	3945	*Gompholobium aristatum*			
398.	10909	*Gompholobium confertum*			
399.	3950	*Gompholobium knightianum*			
400.	3951	*Gompholobium marginatum*			
401.	3954	*Gompholobium polymorphum*			
402.	3955	*Gompholobium preissii*			
403.	11083	*Gompholobium scabrum*			
404.	3957	*Gompholobium tomentosum (Hairy Yellow Pea)*			
405.	3961	*Hardenbergia comptoniana (Native Wisteria)*			
406.	3964	*Hovea chorizemifolia (Holly-leaved Hovea)*			
407.	3966	*Hovea pungens (Devil's Pins)*			
408.	3968	*Hovea trisperma (Common Hovea)*			
409.	3973	*Indigofera colutea (Sticky Indigo)*			
410.	3992	*Isotropis cuneifolia (Granny Bonnets)*			
411.	19700	*Isotropis cuneifolia subsp. cuneifolia*			
412.	3997	*Jacksonia alata*			
413.	3998	*Jacksonia angulata*			
414.	4010	*Jacksonia floribunda (Holly Pea)*			
415.	4012	*Jacksonia furcellata (Grey Stinkwood)*			
416.	4018	*Jacksonia lehmannii*			
417.	4025	*Jacksonia restioides*			
418.	4027	*Jacksonia sericea (Waldjumi)*		P4	
419.	4029	*Jacksonia sternbergiana (Stinkwood)*			
420.	4037	*Kennedia coccinea (Coral Vine)*			
421.	4044	*Kennedia prostrata (Scarlet Runner)*			
422.	4045	*Kennedia stirlingii (Bushy Kennedia)*			
423.	3669	*Labichea punctata (Lance-leaved Cassia)*			
424.	4052	*Latrobea tenella*			
425.	4063	*Lotus uliginosus (Greater Lotus)*	Y		
426.	4065	*Lupinus angustifolius (Narrowleaf Lupin)*	Y		
427.	4066	*Lupinus cosentinii*	Y		

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428.	4067	*Lupinus luteus (Yellow Lupin)*	Y		
429.	4070	*Macroptilium atropurpureum (Purple Bean)*	Y		
430.	4072	*Medicago arabica (Spotted Medic)*	Y		
431.	4079	*Medicago polymorpha (Burr Medic)*	Y		
432.	4100	*Mirbelia spinosa*			
433.	3618	*Paraserianthes lophantha (Albizia)*			
434.	17114	*Paraserianthes lophantha subsp. lophantha*			
435.	4172	*Pultenaea ericifolia*			
436.	4205	*Sphaerolobium linophyllum*			
437.	4206	*Sphaerolobium macranthum*			
438.	4207	*Sphaerolobium medium*			
439.	4211	*Sphaerolobium vimineum (Leafless Globe Pea)*			
440.	4251	*Templetonia drummondii*		P4	
441.	4291	*Trifolium arvense (Hare's Foot Clover)*	Y		
442.	4292	*Trifolium campestre (Hop Clover)*	Y		
443.	17763	*Trifolium campestre var. campestre (Hop Clover)*	Y		
444.	4295	*Trifolium dubium (Suckling Clover)*	Y		
445.	4297	*Trifolium glomeratum (Cluster Clover)*	Y		
446.	4303	*Trifolium micranthum (Slender Suckling Clover)*	Y		
447.	17115	*Trifolium repens var. repens*	Y		
448.	34772	*Vachellia karroo*	Y		
449.	4319	*Vicia benghalensis (Purple Vetch)*	Y		
450.	4320	*Vicia hirsuta (Hairy Vetch)*	Y		
451.	11474	*Vicia sativa subsp. nigra*	Y		
452.	12070	*Vicia sativa subsp. sativa*	Y		
453.	4325	*Viminaria juncea (Swishbush)*			
Fissidentaceae					
454.	32469	*Fissidens taylorii var. taylorii*			
Funariaceae					
455.	32370	*Funaria hygrometrica*			
Gentianaceae					
456.	6539	*Centaurium erythraea (Common Centaury)*	Y		
457.	6542	*Centaurium tenuiflorum*	Y		
Geraniaceae					
458.	4332	*Erodium botrys (Long Storksbill)*	Y		
459.	4335	*Erodium cygnorum (Blue Heronsbill)*			
460.	4343	*Pelargonium capitatum (Rose Pelargonium)*	Y		
Goodeniaceae					
461.	7420	*Dampiera alata (Winged-stem Dampiera)*			
462.	7428	*Dampiera coronata (Wedge-leaved Dampiera)*			
463.	7438	*Dampiera eriocephala (Woolly-headed Dampiera)*			
464.	7454	*Dampiera linearis (Common Dampiera)*			
465.	7462	*Dampiera pedunculata*			
466.	7475	*Dampiera spicigera (Spiked Dampiera)*			
467.	7485	*Dampiera triloba*		P1	
468.	29362	*Goodenia coerulea*			
469.	7517	*Goodenia incana (Hoary Goodenia)*			
470.	12551	*Goodenia micrantha*			
471.	19286	*Goodenia pulchella subsp. Coastal Plain A (M. Hislop 634)*			
472.	7568	*Lechenaultia biloba (Blue Leschenaultia)*			
473.	7572	*Lechenaultia expansa*			
474.	7574	*Lechenaultia floribunda (Free-flowering Leschenaultia)*			
475.	7602	*Scaevola calliptera*			
476.	7603	*Scaevola canescens (Grey Scaevola)*			
477.	7613	*Scaevola glandulifera (Viscid Hand-flower)*			
478.	7635	*Scaevola pilosa (Hairy Fan-flower)*			
479.	7636	*Scaevola platyphylla (Broad-leaved Fanflower)*			
480.	12585	*Scaevola repens*			
481.	13182	*Scaevola repens var. repens*			
482.	13152	*Scaevola thesioides subsp. thesioides*			
483.	7665	*Velleia trinervis*			
Gracilariaceae					
484.	26876	*Gracilaria verrucosa*			
Haemodoraceae					
485.	11470	*Anigozanthos bicolor subsp. bicolor*			
486.	1407	*Anigozanthos flavidus (Tall Kangaroo Paw)*			
487.	1409	*Anigozanthos humilis (Catspaw)*			

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488.	11434	*Anigozanthos humilis subsp. humilis*			
489.	1411	*Anigozanthos manglesii (Mangles Kangaroo Paw)*			
490.	11261	*Anigozanthos manglesii subsp. manglesii*			
491.	1417	*Blancoa canescens (Winter Bell)*			
492.	1418	*Conostylis aculeata (Prickly Conostylis)*			
493.	11826	*Conostylis aculeata subsp. aculeata*			
494.	11513	*Conostylis aculeata subsp. cygnorum*			
495.	1420	*Conostylis androstemma (Trumpets)*			
496.	1423	*Conostylis aurea (Golden Conostylis)*			
497.	11438	*Conostylis candicans subsp. candicans*			
498.	1429	*Conostylis caricina*			
499.	12035	*Conostylis caricina subsp. caricina*			
500.	11695	*Conostylis festucacea subsp. festucacea*			
501.	1436	*Conostylis juncea*			
502.	1454	*Conostylis setigera (Bristly Cottonhead)*			
503.	11597	*Conostylis setigera subsp. setigera*			
504.	1455	*Conostylis setosa (White Cottonhead)*			
505.	1464	*Haemodorum brevisepalum*			
506.	1468	*Haemodorum laxum*			
507.	1469	*Haemodorum loratum*		P3	
508.	1470	*Haemodorum paniculatum (Mardja)*			
509.	1472	*Haemodorum simplex*			
510.	1474	*Haemodorum sparsiflorum*			
511.	1475	*Haemodorum spicatum (Mardja)*			
512.	1478	*Phlebocarya ciliata*			
513.	1479	*Phlebocarya filifolia*			
514.	1481	*Tribonanthes australis*			
515.	1482	*Tribonanthes brachypetala*			
516.	1483	*Tribonanthes longipetala*			
517.	1485	*Tribonanthes violacea*			
Haloragaceae					
518.	6143	*Glischrocaryon aureum (Common Popflower)*			
519.	6149	*Gonocarpus cordiger*			
520.	6161	*Gonocarpus pithyoides*			
521.	34676	*Meionectes brownii (Swamp Raspwort)*			
522.	6185	*Myriophyllum aquaticum (Brazilian Water Milfoil)*	Y		
523.	6189	*Myriophyllum crispatum*			
524.	6192	*Myriophyllum drummondii*			
525.	6193	*Myriophyllum echinatum*		P3	
526.	6195	*Myriophyllum limnophilum*			
527.	35016	*Trihaloragis hexandra subsp. integrifolia*			
Hemerocallidaceae					
528.	23474	*Agrostocrinum hirsutum*			
529.	1264	*Arnocrinum preissii*			
530.	1276	*Caesia micrantha (Pale Grass-lily)*			
531.	1277	*Caesia occidentalis*			
532.	1285	*Corynotheca micrantha (Sand Lily)*			
533.	1259	*Dianella revoluta (Blueberry Lily)*			
534.	11636	*Dianella revoluta var. divaricata*			
535.	1293	*Hensmania turbinata*			
536.	1298	*Johnsonia pubescens (Pipe Lily)*			
537.	19632	*Johnsonia pubescens subsp. pubescens*			
538.	1260	*Stypandra glauca (Blind Grass)*			
539.	1361	*Tricoryne elatior (Yellow Autumn Lily)*			
540.	1363	*Tricoryne tenella*			
Hydatellaceae					
541.	1139	*Trithuria bibracteata*			
542.	32658	*Trithuria occidentalis (Swan Hydatella)*		T	
Hydrocharitaceae					
543.	159	*Egeria densa (Dense Waterweed)*	Y		
544.	166	*Hydrilla verticillata (Water Thyme)*			
545.	17868	*Vallisneria nana*			
Hypericaceae					
546.	5180	*Hypericum gramineum (Small St John's Wort)*			
Hypoxidaceae					
547.	11736	*Hypoxis occidentalis var. occidentalis*			
548.	11845	*Hypoxis occidentalis var. quadriloba*			

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Iridaceae					
549.	18279	*Babiana angustifolia*	Y		
550.	1513	*Chasmanthe floribunda (African Cornflag)*	Y		
551.	18392	*Freesia alba x leichtlinii*	Y		
552.	18298	*Gladiolus carneus*	Y		
553.	1520	*Gladiolus caryophyllaceus (Wild Gladiolus)*	Y		
554.	1524	*Gladiolus undulatus (Wild Gladiolus)*	Y		
555.	1526	*Hesperantha falcata*	Y		
556.	19180	*Moraea miniata (Two-leaf Cape Tulip)*	Y		
557.	11442	*Orthrosanthus laxus var. gramineus (Grass-leaved Orthrosanthus)*			
558.	11749	*Orthrosanthus laxus var. laxus (Morning Iris)*			
559.	1546	*Patersonia juncea (Rush Leaved Patersonia)*			
560.	1550	*Patersonia occidentalis (Purple Flag)*			
561.	30472	*Patersonia occidentalis var. occidentalis*			
562.	14433	*Patersonia rudis subsp. rudis*			
563.	1554	*Romulea flava*	Y		
564.	14485	*Romulea flava var. minor*	Y		
565.	1556	*Romulea rosea (Guildford Grass)*	Y		
566.	11544	*Romulea rosea var. australis (Guildford Grass)*	Y		
567.	1558	*Sparaxis bulbifera*	Y		
568.	18118	*Watsonia meriana var. meriana*	Y		
Juncaceae					
569.	20454	*Juncus acutus subsp. acutus*	Y		
570.	8328	*Juncus amabilis*			
571.	1176	*Juncus aridicola*			
572.	1180	*Juncus capitatus (Capitate Rush)*	Y		
573.	1185	*Juncus kraussii (Sea Rush)*			
574.	11922	*Juncus kraussii subsp. australiensis*			
575.	1186	*Juncus microcephalus*	Y		
576.	1188	*Juncus pallidus (Pale Rush)*			
577.	1198	*Luzula meridionalis (Field Woodrush)*			
Juncaginaceae					
578.	40661	*Cycnogeton lineare*			
579.	147	*Triglochin mucronata*			
580.	18587	*Triglochin nana*			
581.	151	*Triglochin striata*			
Lamiaceae					
582.	16934	*Hemiandra glabra subsp. glabra*			
583.	6836	*Hemiandra incana*			
584.	6838	*Hemiandra linearis (Speckled Snakebush)*			
585.	6839	*Hemiandra pungens (Snakebush)*			
586.	33277	*Hemigenia argentea*			
587.	6856	*Hemigenia incana (Silky Hemigenia)*			
588.	41020	*Hemiphora bartlingii (Woolly Dragon)*			
589.	15994	*Mentha x piperita var. citrata*	Y		
590.	6930	*Stachys arvensis (Staggerweed)*	Y		
Lauraceae					
591.	2951	*Cassytha flava (Dodder Laurel)*			
592.	2952	*Cassytha glabella (Tangled Dodder Laurel)*			
593.	11501	*Cassytha glabella forma casuarinae*			
594.	2956	*Cassytha pomiformis (Dodder Laurel)*			
595.	2957	*Cassytha racemosa (Dodder Laurel)*			
Lentibulariaceae					
596.	7138	*Utricularia inaequalis*			
597.	7145	*Utricularia menziesii (Redcoats)*			
598.	7148	*Utricularia multifida*			
599.	7157	*Utricularia violacea (Violet Bladderwort)*			
600.	7158	*Utricularia volubilis (Twining Bladderwort)*			
Linaceae					
601.	4363	*Linum trigynum (French Flax)*	Y		
602.	4364	*Linum usitatissimum (Flax)*	Y		
Loganiaceae					
603.	6506	*Logania campanulata (Bell-flowered Logania)*			
Loranthaceae					
604.	2375	*Amyema linophylla*			
605.	2383	*Amyema preissii (Wireleaf Mistletoe)*			

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606.	2401	*Nuytsia floribunda (Christmas Tree)*			
Lythraceae					
607.	5281	*Lythrum hyssopifolia (Lesser Loosestrife)*	Y		
Malvaceae					
608.	19708	*Abutilon grandifolium*	Y		
609.	17900	*Alyogyne pinoniana var. leptochlamys*			
610.	5013	*Guichenotia micrantha (Small Flowered Guichenotia)*			
611.	4926	*Hibiscus diversifolius*	Y		
612.	5025	*Lasiopetalum bracteatum (Helena Velvet Bush)*		P4	
613.	5080	*Thomasia foliosa*			
614.	11625	*Thomasia glutinosa var. glutinosa*			
615.	5084	*Thomasia grandiflora (Large Flowered Thomasia)*			
616.	5087	*Thomasia macrocarpa (Large Fruited Thomasia)*			
617.	5092	*Thomasia pauciflora (Few Flowered Thomasia)*			
Marsileaceae					
618.	74	*Marsilea drummondii (Common Nardoo)*			
619.	77	*Marsilea mutica*			
Menyanthaceae					
620.	36160	*Liparophyllum capitatum*			
621.	36179	*Liparophyllum violifolium*			
622.	36177	*Ornduffia albiflora*			
623.	36200	*Ornduffia submersa*		P4	
Molluginaceae					
624.	2838	*Macarthuria apetala*			
625.	2839	*Macarthuria australis*			
626.	17106	*Macarthuria keigheryi*		T	
Moraceae					
627.	1747	*Ficus carica (Common Fig)*	Y		
Myrtaceae					
628.	20350	*Astartea affinis*			
629.	20249	*Astartea leptophylla*			
630.	20283	*Astartea scoparia*			
631.	36441	*Babingtonia camphorosmae (Camphor Myrtle)*			
632.	15785	*Baeckea sp. Darling Range (R.J. Cranfield 1673)*			
633.	5387	*Beaufortia macrostemon*			
634.	5393	*Beaufortia squarrosa (Sand Bottlebrush)*			
635.	5396	*Calothamnus accedens*		P4	
636.	5415	*Calothamnus lateralis*			
637.	35816	*Calothamnus quadrifidus subsp. quadrifidus*			
638.	5429	*Calothamnus sanguineus (Silky-leaved Blood flower)*			
639.	5439	*Calytrix angulata (Yellow Starflower)*			
640.	5441	*Calytrix aurea*			
641.	5458	*Calytrix flavescens (Summer Starflower)*			
642.	5460	*Calytrix fraseri (Pink Summer Calytrix)*			
643.	5461	*Calytrix glutinosa*			
644.	5465	*Calytrix leschenaultii*			
645.	5498	*Chamelaucium uncinatum (Geraldton Wax)*			
646.	5502	*Conothamnus trinervis*			
647.	17104	*Corymbia calophylla (Marri)*			
648.	5505	*Darwinia apiculata (Scarp Darwinia)*		T	
649.	5508	*Darwinia citriodora (Lemon-scented Darwinia)*			
650.	5540	*Eremaea fimbriata*			
651.	5541	*Eremaea pauciflora*			
652.	14104	*Eremaea pauciflora var. pauciflora*			
653.	5708	*Eucalyptus marginata (Jarrah)*			
654.	13547	*Eucalyptus marginata subsp. marginata (Jarrah)*			
655.	13548	*Eucalyptus marginata subsp. thalassica (Blue-leaved Jarrah)*			
656.	5763	*Eucalyptus rudis (Flooded Gum)*			
657.	13511	*Eucalyptus rudis subsp. rudis*			
658.	5790	*Eucalyptus todtiana (Coastal Blackbutt)*			
659.	12906	*Eucalyptus wandoo subsp. wandoo*			
660.	5816	*Homalospermum firmum*			
661.	5817	*Hypocalymma angustifolium (White Myrtle)*			
662.	35074	*Hypocalymma angustifolium subsp. Dandaragan plateau (S. Patrick 702A)*			
663.	35070	*Hypocalymma angustifolium subsp. Swan Coastal Plain (G.J. Keighery 16777)*			
664.	5825	*Hypocalymma robustum (Swan River Myrtle)*			
665.	14493	*Hypocalymma sp. Cataby (G.J. Keighery 5151)*			

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				P2	
666.	15498	*Kunzea glabrescens (Spearwood)*			
667.	5847	*Leptospermum erubescens (Roadside Teatree)*			
668.	40780	*Melaleuca citrina*	Y		
669.	5900	*Melaleuca cuticularis (Saltwater Paperbark)*			
670.	13273	*Melaleuca incana subsp. incana*			
671.	5922	*Melaleuca lanceolata (Rottnest Teatree)*			
672.	5926	*Melaleuca lateritia (Robin Redbreast Bush)*			
673.	5952	*Melaleuca preissiana (Moonah)*			
674.	5958	*Melaleuca radula (Graceful Honeymyrtle)*			
675.	5959	*Melaleuca rhaphiophylla (Swamp Paperbark)*			
676.	5961	*Melaleuca scabra (Rough Honeymyrtle)*			
677.	5964	*Melaleuca seriata*			
678.	5978	*Melaleuca teretifolia (Banbar)*			
679.	5983	*Melaleuca trichophylla*			
680.	18232	*Melaleuca tuberculata var. tuberculata*			
681.	37683	*Melaleuca viminalis*		P2	
682.	5987	*Melaleuca viminea (Mohan)*			
683.	13280	*Melaleuca viminea subsp. viminea*			
684.	16478	*Pericalymma ellipticum var. floridum*			
685.	6012	*Regelia ciliata*			
686.	6033	*Scholtzia involucrata (Spiked Scholtzia)*			
687.	20135	*Taxandria linearifolia*			
688.	15431	*Verticordia acerosa var. acerosa*			
689.	12388	*Verticordia acerosa var. preissii*			
690.	15432	*Verticordia densiflora var. densiflora*			
691.	6077	*Verticordia drummondii (Drummond's Featherflower)*			
692.	15433	*Verticordia huegelii var. huegelii*			
693.	14714	*Verticordia lindleyi subsp. lindleyi*		P4	
694.	6101	*Verticordia nitens (Morrison Featherflower)*			
695.	6107	*Verticordia pennigera*			
696.	6109	*Verticordia picta (Painted Featherflower)*			
697.	12449	*Verticordia plumosa var. brachyphylla*			
698.	15618	*Verticordia plumosa var. plumosa*			
Olacaceae					
699.	2365	*Olax benthamiana*			
700.	2367	*Olax scalariformis*			
Onagraceae					
701.	6132	*Epilobium ciliatum*	Y		
702.	6133	*Epilobium hirtigerum (Hairy Willow Herb)*			
703.	14289	*Epilobium tetragonum subsp. tetragonum*	Y		
704.	6138	*Oenothera drummondii (Beach Evening Primrose)*	Y		
Orchidaceae					
705.	15330	*Caladenia arenicola*			
706.	11136	*Caladenia denticulata*			
707.	20433	*Caladenia denticulata subsp. Jarrah forest (G.J. Keighery 13592)*			
708.	1586	*Caladenia discoidea (Dancing Orchid)*			
709.	15348	*Caladenia flava subsp. flava*			
710.	15502	*Caladenia footeana*			
711.	17980	*Caladenia hiemalis*			
712.	1596	*Caladenia huegelii (Grand Spider Orchid)*		T	
713.	1599	*Caladenia latifolia (Pink Fairy Orchid)*			
714.	15361	*Caladenia longicauda subsp. calcigena*			
715.	15365	*Caladenia longicauda subsp. longicauda*			
716.	15503	*Caladenia paludosa*			
717.	1609	*Caladenia pectinata (King Spider Orchid)*			
718.	15377	*Caladenia reptans subsp. reptans*			
719.	15114	*Cyanicula gemmata*			
720.	10942	*Cyrtostylis tenuissima*			
721.	12943	*Diuris brumalis*			
722.	11049	*Diuris corymbosa*			
723.	1634	*Diuris laxiflora (Bee Orchid)*			
724.	12939	*Diuris magnifica*			
725.	15436	*Diuris porrifolia*			
726.	15406	*Drakaea gracilis*			
727.	11156	*Drakaea livida*			
728.	1643	*Elythranthera brunonis (Purple Enamel Orchid)*			
729.	1645	*Epiblema grandiflorum (Babe-in-a-cradle)*			
730.	15412	*Eriochilus dilatatus subsp. multiflorus*			

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731.	15414	*Eriochilus helonomos*			
732.	15415	*Eriochilus scaber subsp. scaber*			
733.	1653	*Leporella fimbriata (Hare Orchid)*			
734.	15418	*Leptoceras menziesii*			
735.	1657	*Microtis alba (White Mignonette Orchid)*			
736.	34158	*Microtis alboviridis*			
737.	1658	*Microtis atrata (Swamp Mignonette Orchid)*			
738.	10954	*Microtis media (Tall Mignonette Orchid)*			
739.	12761	*Microtis media subsp. densiflora*			
740.	15419	*Microtis media subsp. media*			
741.	23500	*Paracaleana hortiorum*			
742.	20460	*Pheladenia deformis*			
743.	1670	*Prasophyllum drummondii (Swamp Leek Orchid)*			
744.	1671	*Prasophyllum elatum (Tall Leek Orchid)*			
745.	1672	*Prasophyllum fimbria (Fringed Leek Orchid)*			
746.	1673	*Prasophyllum gibbosum (Humped Leek Orchid)*			
747.	1674	*Prasophyllum giganteum (Bronze Leek Orchid)*			
748.	1677	*Prasophyllum macrostachyum (Laughing Leek Orchid)*			
749.	17650	*Prasophyllum odoratissimum*			
750.	1680	*Prasophyllum parvifolium (Autumn Leek Orchid)*			
751.	10853	*Prasophyllum plumiforme*			
752.	1693	*Pterostylis recurva (Jug Orchid)*			
753.	12217	*Pterostylis sanguinea*			
754.	16367	*Pyrorchis nigricans (Red beaks)*			
755.	1701	*Thelymitra antennifera (Vanilla Orchid)*			
756.	10856	*Thelymitra benthamiana (Cinnamon Sun Orchid)*			
757.	1702	*Thelymitra campanulata (Shirt Orchid)*			
758.	1704	*Thelymitra cornicina (Lilac Sun Orchid)*			
759.	1705	*Thelymitra crinita (Blue Lady Orchid)*			
760.	1707	*Thelymitra flexuosa (Twisted Sun Orchid)*			
761.	11053	*Thelymitra macrophylla*			
762.	20729	*Thelymitra magnifica*		P1	
763.	1710	*Thelymitra mucida (Plum Orchid)*			
764.	10862	*Thelymitra stellata (Star Sun Orchid)*		T	
765.	1716	*Thelymitra tigrina (Tiger Orchid)*			
766.	20731	*Thelymitra vulgaris*			
Orobanchaceae					
767.	7122	*Orobanche minor (Lesser Broomrape)*	Y		
Oxalidaceae					
768.	33256	*Oxalis bowiei (Bowie Wood Sorrel)*	Y		
769.	30375	*Oxalis exilis*			
770.	4352	*Oxalis glabra*	Y		
771.	4354	*Oxalis incarnata*	Y		
772.	4358	*Oxalis purpurea (Largeflower Wood Sorrel)*	Y		
Papaveraceae					
773.	2969	*Fumaria capreolata (Whiteflower Fumitory)*	Y		
774.	31532	*Fumaria muralis subsp. muralis*	Y		
775.	2967	*Romneya coulteri (California Tree Poppy)*	Y		
Philydraceae					
776.	1172	*Philydrella drummondii*			
777.	1173	*Philydrella pygmaea (Butterfly Flowers)*			
Phyllanthaceae					
778.	4675	*Phyllanthus calycinus (False Boronia)*			
779.	4688	*Poranthera drummondii*			
780.	4691	*Poranthera microphylla (Small Poranthera)*			
Phytolaccaceae					
781.	2793	*Phytolacca octandra (Red Ink Plant)*	Y		
Pittosporaceae					
782.	25788	*Billardiera fraseri (Elegant Pronaya)*			
783.	17635	*Marianthus drummondianus*			
Plantaginaceae					
784.	16346	*Bacopa monnieri*	Y		
785.	4717	*Callitriche stagnalis (Common Starwort)*	Y		
786.	14282	*Gratiola pubescens*			
787.	7068	*Kickxia spuria (Roundleaf Toadflax)*	Y		
788.	7085	*Misopates orontium (Lesser Snapdragon)*	Y		

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789.	7303	*Plantago lanceolata (Ribwort Plantain)*	Y		
790.	7304	*Plantago major (Greater Plantain)*	Y		
Poaceae					
791.	185	*Aira cupaniana (Silvery Hairgrass)*	Y		
792.	190	*Alopecurus myosuroides (Slender Foxtail)*	Y		
793.	194	*Amphipogon amphipogonoides*			
794.	197	*Amphipogon debilis*			
795.	20184	*Amphipogon laguroides subsp. laguroides*			
796.	200	*Amphipogon turbinatus*			
797.	226	*Arundo donax (Giant Reed)*	Y		
798.	17233	*Austrostipa campylachne*			
799.	17234	*Austrostipa compressa*			
800.	17237	*Austrostipa elegantissima*			
801.	17241	*Austrostipa hemipogon*			
802.	17257	*Austrostipa variabilis*			
803.	231	*Avellinia michelii*	Y		
804.	233	*Avena barbata (Bearded Oat)*	Y		
805.	244	*Briza maxima (Blowfly Grass)*	Y		
806.	245	*Briza minor (Shivery Grass)*	Y		
807.	246	*Bromus alopecuros*	Y		
808.	248	*Bromus catharticus (Prairie Grass)*	Y		
809.	250	*Bromus hordeaceus (Soft Brome)*	Y		
810.	252	*Bromus madritensis (Madrid Brome)*	Y		
811.	259	*Cenchrus echinatus (Burrgrass)*	Y		
812.	41566	*Cenchrus longisetus (Feathertop)*	Y		
813.	41567	*Cenchrus macrourus (African Feather Grass)*	Y		
814.	41563	*Cenchrus purpureus (Elephant Grass)*	Y		
815.	276	*Coix lacryma-jobi (Job's Tears)*	Y		Y
816.	277	*Cortaderia selloana (Pampas Grass)*	Y		
817.	278	*Crypsis schoenoides*	Y		
818.	320	*Digitaria sanguinalis (Crab Grass)*	Y		
819.	338	*Echinochloa telmatophila (Swamp Barnyard Grass)*	Y		
820.	11818	*Ehrharta brevifolia var. brevifolia*	Y		
821.	11485	*Ehrharta brevifolia var. cuspidata*	Y		
822.	347	*Ehrharta calycina (Perennial Veldt Grass)*	Y		
823.	349	*Ehrharta longiflora (Annual Veldt Grass)*	Y		
824.	376	*Eragrostis curvula (African Lovegrass)*	Y		
825.	379	*Eragrostis elongata (Clustered Lovegrass)*			
826.	429	*Eustachys distichophylla (Evergreen Chloris)*	Y		
827.	431	*Festuca pratensis (Meadow Fescue)*	Y		
828.	434	*Gastridium phleoides (Nitgrass)*	Y		
829.	444	*Holcus lanatus (Yorkshire Fog)*	Y		
830.	449	*Hordeum leporinum (Barley Grass)*	Y		
831.	452	*Hyparrhenia hirta (Tambookie Grass)*	Y		
832.	20019	*Lachnagrostis filiformis*			
833.	467	*Lagurus ovatus (Hare's Tail Grass)*	Y		
834.	476	*Lolium perenne (Perennial Ryegrass)*	Y		
835.	14985	*Melinis repens*	Y		
836.	492	*Neurachne alopecuroidea (Foxtail Mulga Grass)*			
837.	527	*Paspalum dilatatum*	Y		
838.	532	*Paspalum urvillei (Vasey Grass)*	Y		
839.	40422	*Pentameris pallida*	Y		
840.	547	*Phalaris angusta*	Y		
841.	551	*Phalaris minor (Lesser Canary Grass)*	Y		
842.	552	*Phalaris paradoxa (Paradoxa Grass)*	Y		
843.	571	*Poa annua (Winter Grass)*	Y		
844.	573	*Poa drummondiana (Knotted Poa)*			
845.	582	*Polypogon monspeliensis (Annual Beardgrass)*	Y		
846.	40426	*Rytidosperma occidentale*			
847.	40427	*Rytidosperma setaceum*			
848.	613	*Setaria verticillata (Whorled Pigeon Grass)*	Y		
849.	616	*Sorghum bicolor (Grain Sorghum)*	Y		
850.	617	*Sorghum halepense (Johnson Grass)*	Y		
851.	35236	*Sorghum x drummondii (Sudan Grass)*	Y		
852.	8710	*Sporobolus africanus (Parramatta Grass)*	Y		
853.	635	*Sporobolus virginicus (Marine Couch)*			
854.	708	*Triticum aestivum (Wheat)*	Y		
855.	722	*Vulpia bromoides (Squirrel Tail Fescue)*	Y		
856.	12052	*Vulpia myuros forma megalura*	Y		
857.	33101	*Vulpia myuros forma myuros*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
			Y		
Polygalaceae					
858.	4550	*Comesperma calymega (Blue-spike Milkwort)*			
859.	4551	*Comesperma ciliatum*			
860.	4554	*Comesperma flavum*			
861.	4564	*Comesperma virgatum (Milkwort)*			
Polygonaceae					
862.	2415	*Muehlenbeckia polybotrya*			
863.	13911	*Persicaria decipiens*			
864.	16983	*Persicaria maculosa*	Y		
865.	2419	*Polygonum aviculare (Wireweed)*	Y		
Portulacaceae					
866.	16365	*Calandrinia sp. Kenwick (G.J. Keighery 10905)*			
Potamogetonaceae					
867.	112	*Potamogeton pectinatus (Fennel Pondweed)*			
Pottiaceae					
868.	32315	*Barbula calycina*			
869.	32438	*Syntrichia pagorum*			
870.	32445	*Tortula muralis*			
Primulaceae					
871.	36375	*Lysimachia arvensis (Pimpernel)*	Y		
872.	6483	*Samolus junceus*			
873.	6484	*Samolus repens (Creeping Brookweed)*			
Proteaceae					
874.	1775	*Adenanthos cygnorum (Common Woollybush)*			
875.	11837	*Adenanthos cygnorum subsp. cygnorum (Common Woollybush)*			
876.	1791	*Adenanthos obovatus (Basket Flower)*			
877.	32682	*Banksia armata var. armata*			
878.	1800	*Banksia attenuata (Slender Banksia)*			
879.	32576	*Banksia dallanneyi (Couch Honeypot)*			
880.	32580	*Banksia dallanneyi var. dallanneyi*			
881.	32577	*Banksia dallanneyi var. mellicula*			
882.	1819	*Banksia grandis (Bull Banksia)*			
883.	1822	*Banksia ilicifolia (Holly-leaved Banksia)*			
884.	1823	*Banksia incana*			
885.	33399	*Banksia incana var. incana*			
886.	1834	*Banksia menziesii (Firewood Banksia)*			
887.	32211	*Banksia mimica (Summer Honeypot)*		T	
888.	32202	*Banksia nivea (Honeypot Dryandra)*			
889.	32138	*Banksia pteridifolia subsp. vernalis*		P3	
890.	32080	*Banksia sessilis var. sessilis*			
891.	1852	*Banksia telmatiaea (Swamp Fox Banksia)*			
892.	1857	*Conospermum acerosum (Needle-leaved Smokebush)*			
893.	15607	*Conospermum acerosum subsp. acerosum*			
894.	15041	*Conospermum canaliculatum*			
895.	16853	*Conospermum capitatum subsp. glabratum*			
896.	1876	*Conospermum incurvum (Plume Smokebush)*			
897.	15520	*Conospermum stoechadis subsp. sclerophyllum*			
898.	15611	*Conospermum stoechadis subsp. stoechadis (Common Smokebush)*			
899.	1885	*Conospermum triplinervium (Tree Smokebush)*			
900.	13999	*Conospermum undulatum*		T	
901.	1964	*Grevillea bipinnatifida (Fuchsia Grevillea)*			
902.	19628	*Grevillea bipinnatifida subsp. bipinnatifida*			
903.	13429	*Grevillea diversifolia subsp. diversifolia*			
904.	1997	*Grevillea endlicheriana (Spindly Grevillea)*			
905.	13450	*Grevillea manglesii subsp. manglesii*			
906.	2066	*Grevillea pilulifera (Woolly-flowered Grevillea)*			
907.	2101	*Grevillea synapheae (Catkin Grevillea)*			
908.	13439	*Grevillea thelemanniana subsp. thelemanniana (Spider Net Grevillea)*		P4	
909.	2119	*Grevillea vestita*			
910.	2122	*Grevillea wilsonii (Native Fuchsia)*			
911.	2137	*Hakea ceratophylla (Horned Leaf Hakea)*			
912.	2143	*Hakea conchifolia (Shell-leaved Hakea)*			
913.	2158	*Hakea erinacea (Hedge-hog Hakea)*			
914.	2166	*Hakea incrassata (Marble Hakea)*			
915.	2175	*Hakea lissocarpha (Honey Bush)*			
916.	2185	*Hakea myrtoides (Myrtle Hakea)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
917.	2197	*Hakea prostrata (Harsh Hakea)*			
918.	2203	*Hakea ruscifolia (Candle Hakea)*			
919.	31793	*Hakea sp. Eastern coastal plain (G.J. Keighery 8014)*			
920.	12234	*Hakea spathulata*			
921.	2206	*Hakea stenocarpa (Narrow-fruited Hakea)*			
922.	2212	*Hakea sulcata (Furrowed Hakea)*			
923.	2214	*Hakea trifurcata (Two-leaf Hakea)*			
924.	2215	*Hakea undulata (Wavy-leaved Hakea)*			
925.	2216	*Hakea varia (Variable-leaved Hakea)*			
926.	2221	*Isopogon asper*			
927.	2228	*Isopogon drummondii*		P3	
928.	2229	*Isopogon dubius (Pincushion Coneflower)*			
929.	2249	*Lambertia multiflora (Many-flowered Honeysuckle)*			
930.	14083	*Lambertia multiflora var. darlingensis*			
931.	2255	*Persoonia angustiflora*			
932.	2262	*Persoonia elliptica (Spreading Snottygobble)*			
933.	2273	*Persoonia saccata (Snottygobble)*			
934.	2284	*Petrophile biloba (Granite Petrophile)*			
935.	2299	*Petrophile linearis (Pixie Mops)*			
936.	2301	*Petrophile macrostachya*			
937.	2306	*Petrophile rigida*			
938.	2308	*Petrophile seminuda*			
939.	20053	*Petrophile squamata subsp. northern (J. Monks 40)*			
940.	2312	*Petrophile striata*			
941.	2316	*Stirlingia latifolia (Blueboy)*			
942.	2321	*Synaphea acutiloba (Granite Synaphea)*			
943.	2323	*Synaphea gracillima*			
944.	16864	*Synaphea petiolaris subsp. petiolaris*			
945.	2325	*Synaphea pinnata (Helena Synaphea)*			
946.	2329	*Synaphea spinulosa*			
947.	15532	*Synaphea spinulosa subsp. spinulosa*			
948.	2331	*Xylomelum occidentale (Woody Pear)*			
Pteridaceae					
949.	29	*Anogramma leptophylla (Annual Fern)*			
950.	31	*Cheilanthes austrotenuifolia*			
Ranunculaceae					
951.	2929	*Clematis pubescens (Common Clematis)*			
952.	2933	*Ranunculus muricatus (Sharp Buttercup)*	Y		
953.	2938	*Ranunculus trilobus (Buttercup)*	Y		
Restionaceae					
954.	1056	*Alexgeorgea nitens*			
955.	17706	*Chordifex sinuosus*			
956.	17692	*Cytogonidium leptocarpoides*			
957.	17663	*Desmocladus asper*			
958.	17691	*Desmocladus fasciculatus*			
959.	17838	*Dielsia stenostachya*			
960.	1067	*Empodisma gracillimum*			
961.	1070	*Hypolaena exsulca*			
962.	17841	*Hypolaena pubescens*			
963.	1075	*Lepidobolus preissianus*			
964.	18074	*Lepidobolus preissianus subsp. preissianus*			
965.	19833	*Leptocarpus laxus*			
966.	19241	*Lepyrodia curvescens*		P2	
967.	1088	*Lepyrodia macra (Large Scale Rush)*			
968.	1090	*Lepyrodia muirii*			
969.	15562	*Lepyrodia riparia*			
970.	15835	*Loxocarya striata*			
971.	17679	*Meeboldina coangustata*			
972.	17677	*Meeboldina roycei*			
973.	17694	*Meeboldina scariosa*			
974.	17843	*Meeboldina tephrina*			
Rhamnaceae					
975.	13470	*Cryptandra arbutiflora var. arbutiflora*			
976.	4810	*Cryptandra scoparia*			
977.	16197	*Stenanthemum emarginatum*			
978.	13475	*Stenanthemum humile*			
979.	13479	*Trymalium ledifolium var. rosmarinifolium*			
980.	33418	*Trymalium odoratissimum subsp. odoratissimum*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Rosaceae					
981.	10931	*Rosa chinensis x moschata*	Y		
982.	20496	*Rubus laudatus*	Y		
Rubiaceae					
983.	18255	*Opercularia vaginata (Dog Weed)*			
Rutaceae					
984.	4414	*Boronia cymosa (Granite Boronia)*			
985.	4432	*Boronia ovata*			
986.	4438	*Boronia ramosa*			
987.	11381	*Boronia ramosa subsp. anethifolia*			
988.	18529	*Philotheca spicata (Pepper and Salt)*			
Salicaceae					
989.	20063	*Salix babylonica*	Y		
990.	31594	*Salix cinerea*	Y		Y
Salviniaceae					
991.	80	*Azolla filiculoides (Pacific Azolla)*			
Santalaceae					
992.	2344	*Leptomeria empetriformis*			
Schizaeaceae					
993.	24	*Schizaea fistulosa (Narrow Comb Fern)*			
Scrophulariaceae					
994.	7054	*Dischisma arenarium*	Y		
995.	7055	*Dischisma capitatum (Woolly-headed Dischisma)*	Y		
996.	13405	*Phyllopodium cordatum*	Y		
Selaginellaceae					
997.	6	*Selaginella gracillima (Tiny Clubmoss)*			
Sematophyllaceae					
998.	32433	*Sematophyllum homomallum*			
Solanaceae					
999.	10823	*Datura inoxia*	Y		
1000.	10900	*Lycopersicon esculentum*	Y		
1001.	6970	*Nicandra physalodes (Apple of Peru)*	Y		
1002.	6974	*Nicotiana glauca (Tree Tobacco)*	Y		
1003.	6983	*Physalis peruviana (Cape Gooseberry)*	Y		
1004.	6988	*Solanum americanum (Glossy Nightshade)*	Y		
1005.	11114	*Solanum giganteum*	Y		Y
1006.	7017	*Solanum laciniatum (Kangaroo Apple)*	Y		
1007.	7022	*Solanum nigrum (Black Berry Nightshade)*	Y		
1008.	7035	*Solanum sisymbriifolium (Viscid Nightshade)*	Y		
Stylidiaceae					
1009.	7674	*Levenhookia preissii (Preiss's Stylewort)*			
1010.	7676	*Levenhookia pusilla (Midget Stylewort)*			
1011.	7677	*Levenhookia stipitata (Common Stylewort)*			
1012.	7679	*Stylidium adpressum (Trigger-on-stilts)*			
1013.	7681	*Stylidium affine (Queen Triggerplant)*			
1014.	30278	*Stylidium androsaceum*			
1015.	25831	*Stylidium araeophyllum*			
1016.	30276	*Stylidium bicolor*			
1017.	7693	*Stylidium brunonianum (Pink Fountain Triggerplant)*			
1018.	7699	*Stylidium carnosum (Fleshy-leaved Triggerplant)*			
1019.	7710	*Stylidium cygnorum*			
1020.	7713	*Stylidium dichotomum (Pins-and-needles)*			
1021.	7716	*Stylidium diuroides (Donkey Triggerplant)*			
1022.	11808	*Stylidium diuroides subsp. diuroides*			
1023.	7717	*Stylidium divaricatum (Daddy-long-legs)*			
1024.	7734	*Stylidium guttatum (Dotted Triggerplant)*			
1025.	25801	*Stylidium hesperium*			
1026.	7736	*Stylidium hispidum (White Butterfly Triggerplant)*			
1027.	7756	*Stylidium longitubum (Jumping Jacks)*		P3	
1028.	25829	*Stylidium neurophyllum*			
1029.	7768	*Stylidium obtusatum (Pinafore Triggerplant)*			
1030.	7774	*Stylidium piliferum (Common Butterfly Triggerplant)*			
1031.	7782	*Stylidium pulchellum (Thumbelina Triggerplant)*			
1032.	33106	*Stylidium recurvum*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1033.	7785	*Stylidium repens (Matted Triggerplant)*			
1034.	7790	*Stylidium roseoalatum (Pink-wing Triggerplant)*			
1035.	7798	*Stylidium schoenoides (Cow Kicks)*			
1036.	17992	*Stylidium sp. Bindoon (K.F. Kenneally 11405)*			
1037.	25830	*Stylidium sp. Darling Range (H. Bowler 371)*			
1038.	7803	*Stylidium striatum (Fan-leaved Triggerplant)*		P4	
1039.	23511	*Stylidium thesioides (Delicate Triggerplant)*			
1040.	7806	*Stylidium utricularioides (Pink Fan Triggerplant)*			
1041.	40947	*Stylidium xanthellum*			
Tecophilaeaceae					
1042.	1487	*Cyanella hyacinthoides*	Y		
Thymelaeaceae					
1043.	5231	*Pimelea angustifolia (Narrow-leaved Pimelea)*			
1044.	5232	*Pimelea argentea (Silvery Leaved Pimelea)*			
1045.	11928	*Pimelea ciliata subsp. ciliata*			
1046.	11402	*Pimelea imbricata var. piligera*			
1047.	12041	*Pimelea suaveolens subsp. suaveolens (Tall Mulla Mulla)*			
1048.	5268	*Pimelea sulphurea (Yellow Banjine)*			
Tropaeolaceae					
1049.	4360	*Tropaeolum majus (Garden Nasturtium)*	Y		
Typhaceae					
1050.	99	*Typha orientalis (Bulrush)*	Y		
Verbenaceae					
1051.	6733	*Lantana camara (Common Lantana)*	Y		
1052.	17022	*Lantana camara var. camara*	Y		
Violaceae					
1053.	5216	*Hybanthus calycinus (Wild Violet)*			
Xanthorrhoeaceae					
1054.	1252	*Xanthorrhoea drummondii*			
1055.	1256	*Xanthorrhoea preissii (Grass tree)*			
Zamiaceae					
1056.	85	*Macrozamia riedlei (Zamia)*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NatureMap
Mapping Western Australia's biodiversity

NatureMap Fauna Species Report 5 km

Created By Guest user on 28/11/2012

Kingdom Animalia
Current Names Only Yes
Core Datasets Only Yes
Method 'By Line'
Group By Family

Family	Species	Records
Acanthizidae	6	351
Accipitridae	9	168
Agamidae	3	39
Anatidae	14	2658
Anhingidae	1	2
Apodidae	1	1
Ardeidae	9	100
Artamidae	2	7
Boidae	2	5
Burhinidae	1	2
Campephagidae	2	433
Canidae	1	1
Carphodactylidae	1	4
Charadriidae	2	8
Cheluidae	2	26
Columbidae	6	1592
Corvidae	1	811
Cracticidae	5	780
Cuculidae	4	6
Dasyuridae	2	15
Dicaeidae	1	85
Dicruridae	2	1792
Diplodactylidae	4	14
Elapidae	13	348
Equidae	1	1
Estrilidae	1	1
Falconidae	8	179
Felidae	1	3
Fringillidae	2	12
Gekkonidae	3	19
Halcyonidae	4	265
Hirundinidae	2	502
Hylidae	2	22
Laridae	3	4
Limnodynastidae	4	141
Macropodidae	3	5
Maluridae	3	73
Meliphagidae	10	2475
Meropidae	1	114
Molossidae	1	2
Muridae	3	19
Myobatrachidae	5	90
Myrmecobiidae	1	1
Neosittidae	2	3
Pachycephalidae	5	157
Pardalotidae	2	308
Pelecanidae	1	361
Peramelidae	1	41
Petroicidae	2	5
Phalacrocoracidae	4	542
Phalangeridae	1	7
Phasianidae	1	1
Podargidae	2	7
Podicipedidae	5	522
Procellariidae	4	5
Psittacidae	22	1001
Pygopodidae	7	144
Rallidae	11	1505
Recurvirostridae	2	117
Scincidae	17	130
Sciuridae	1	1
Scolopacidae	5	68
Strigidae	3	21
Sturnidae	1	1
Suidae	1	1
Sylviidae	2	407
Tachyglossidae	1	2
Tarsipedidae	1	5
Threskiornithidae	3	685
Turnicidae	1	1
Typhlopidae	5	25
Tytonidae	1	2
Varanidae	2	8
Vespertilionidae	3	9
Zosteropidae	2	357
TOTAL	**273**	**19625**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Acanthizidae					
1.	24260	*Acanthiza apicalis (Broad-tailed Thornbill)*			
2.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
3.	24262	*Acanthiza inornata (Western Thornbill)*			
4.	25530	*Gerygone fusca (Western Gerygone)*			
5.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
6.	30948	*Smicrornis brevirostris (Weebill)*			
Accipitridae					
7.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
8.	24281	*Accipiter cirrocephalus subsp. cirrocephalus*			
9.	25536	*Accipiter fasciatus (Brown Goshawk)*			
10.	24282	*Accipiter fasciatus subsp. fasciatus*			
11.	24285	*Aquila audax (Wedge-tailed Eagle)*			
12.	24286	*Aquila morphnoides subsp. morphnoides*			
13.	24288	*Circus approximans (Swamp Harrier)*			
14.	24290	*Elanus caeruleus subsp. axillaris (Australian Black-shouldered Kite)*			
15.	24295	*Haliastur sphenurus (Whistling Kite)*			
Agamidae					
16.	30899	*Ctenophorus adelaidensis (Southern Heath Dragons)*			
17.	24883	*Ctenophorus ornatus (Ornate Crevice Dragon)*			
18.	24907	*Pogona minor subsp. minor*			
Anatidae					
19.	24310	*Anas castanea (Chestnut Teal)*			
20.	24312	*Anas gracilis (Grey Teal)*			
21.	24313	*Anas platyrhynchos (Mallard)*			
22.	24315	*Anas rhynchotis (Australasian Shoveler)*			
23.	24316	*Anas superciliosa (Pacific Black Duck)*			
24.	24318	*Aythya australis (Hardhead)*			
25.	24319	*Biziura lobata (Musk Duck)*			
26.	24321	*Chenonetta jubata (Australian Wood Duck)*			
27.	24322	*Cygnus atratus (Black Swan)*			
28.	24325	*Dendrocygna eytoni (Plumed Whistling Duck)*			
29.	24326	*Malacorhynchus membranaceus (Pink-eared Duck)*			
30.	24328	*Oxyura australis (Blue-billed Duck)*			
31.	24329	*Stictonetta naevosa (Freckled Duck)*			
32.	24331	*Tadorna tadornoides (Australian Shelduck)*			
Anhingidae					
33.	24332	*Anhinga melanogaster subsp. novaehollandiae*			
Apodidae					
34.	25554	*Apus pacificus (Fork-tailed Swift)*		IA	
Ardeidae					
35.	24336	*Ardea alba subsp. modesta (Eastern Great Egret)*		IA	
36.	25558	*Ardea ibis (Cattle Egret)*		IA	
37.	24340	*Ardea novaehollandiae (White-faced Heron)*			
38.	24341	*Ardea pacifica (White-necked Heron)*			
39.	24345	*Botaurus poiciloptilus (Australasian Bittern)*		T	
40.	24347	*Ixobrychus flavicollis subsp. australis (Australian Black Bittern)*		P3	
41.	24348	*Ixobrychus minutus subsp. dubius (Australian Little Bittern)*		P4	
42.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
43.	24350	*Nycticorax caledonicus subsp. hilli*			
Artamidae					
44.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
45.	24352	*Artamus cinereus subsp. melanops*			
Boidae					
46.	25241	*Antaresia stimsoni subsp. stimsoni*			
47.	25240	*Morelia spilota subsp. imbricata (Carpet Python)*		S	
Burhinidae					
48.	24359	*Burhinus grallarius (Bush Stone-curlew)*		P4	
Campephagidae					
49.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
50.	24367	*Lalage tricolor (White-winged Triller)*			
Canidae					

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
51.	24040	*Vulpes vulpes (Red Fox)*			
Carphodactylidae					
52.	30941	*Nephrurus milii (Barking Gecko)*			
Charadriidae					
53.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
54.	24379	*Erythrogonys cinctus (Red-kneed Dotterel)*			
Cheluidae					
55.	25337	*Chelodina oblonga (Oblong Turtle)*			
56.	25345	*Pseudemydura umbrina (Western Swamp Turtle, tortoise)*		T	
Columbidae					
57.	24399	*Columba livia (Domestic Pigeon)*			
58.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
59.	24409	*Phaps chalcoptera (Common Bronzewing)*			
60.	25589	*Streptopelia chinensis (Spotted Turtle-Dove)*			
61.	30951	*Streptopelia chinensis subsp. tigrina*			
62.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*			
Corvidae					
63.	25592	*Corvus coronoides (Australian Raven)*			
Cracticidae					
64.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
65.	25595	*Cracticus tibicen (Australian Magpie)*			
66.	24422	*Cracticus tibicen subsp. dorsalis (White-backed Magpie)*			
67.	25596	*Cracticus torquatus (Grey Butcherbird)*			
68.	25597	*Strepera versicolor (Grey Currawong)*			
Cuculidae					
69.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
70.	24431	*Chrysococcyx basalis (Horsfield's Bronze Cuckoo)*			
71.	24432	*Chrysococcyx lucidus subsp. plagosus*			
72.	24435	*Cuculus pallidus (Pallid Cuckoo)*			
Dasyuridae					
73.	24092	*Dasyurus geoffroii (Chuditch, Western Quoll)*		T	
74.	24099	*Phascogale tapoatafa subsp. tapoatafa (Southern Brush-tailed Phascogale, Wambenger)*		T	
Dicaeidae					
75.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
Dicruridae					
76.	24443	*Grallina cyanoleuca (Magpie-lark)*			
77.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
Diplodactylidae					
78.	24939	*Diplodactylus polyophthalmus*			
79.	24940	*Diplodactylus pulcher*			
80.	24943	*Strophurus spinigerus subsp. inornatus*			
81.	24942	*Strophurus spinigerus subsp. spinigerus*			
Elapidae					
82.	25333	*Brachyurophis fasciolata subsp. fasciolata*			
83.	25245	*Brachyurophis semifasciata*			
84.	25251	*Echiopsis curta (Bardick)*			
85.	25250	*Elapognathus coronatus (Crowned Snake)*			
86.	25248	*Neelaps bimaculatus (Black-naped Snake)*			
87.	25249	*Neelaps calonotos (Black-striped Snake)*		P3	
88.	25252	*Notechis scutatus (Tiger Snake)*			
89.	25253	*Parasuta gouldii*			
90.	25261	*Pseudechis australis (Mulga Snake)*			
91.	25511	*Pseudonaja affinis (Dugite)*			
92.	25259	*Pseudonaja affinis subsp. affinis (Dugite)*			
93.	25264	*Pseudonaja nuchalis (Gwardar)*			
94.	25266	*Simoselaps bertholdi (Jan's Banded Snake)*			
Equidae					
95.	24258	*Equus caballus (Horse)*			
Estrilidae					
96.	24645	*Stagonopleura oculata (Red-eared Firetail)*			
Falconidae					
97.	25621	*Falco berigora (Brown Falcon)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
98.	24471	*Falco berigora subsp. berigora*			
99.	25622	*Falco cenchroides (Australian Kestrel)*			
100.	24472	*Falco cenchroides subsp. cenchroides*			
101.	25623	*Falco longipennis (Australian Hobby)*			
102.	24474	*Falco longipennis subsp. longipennis*			
103.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
104.	24475	*Falco peregrinus subsp. macropus (Australian Peregrine Falcon)*		S	
Felidae					
105.	24041	*Felis catus (Cat)*			
Fringillidae					
106.	25625	*Carduelis carduelis (Goldfinch)*			
107.	24480	*Carduelis carduelis subsp. britannica*			
Gekkonidae					
108.	24980	*Christinus marmoratus (Marbled Gecko)*			
109.	24959	*Gehyra variegata*			
110.	25232	*Hemidactylus frenatus (Asian House Gecko)*			
Halcyonidae					
111.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*			
112.	30902	*Dacelo novaeguineae subsp. novaeguineae*			
113.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
114.	24309	*Todiramphus sanctus subsp. sanctus*			
Hirundinidae					
115.	24491	*Hirundo neoxena (Welcome Swallow)*			
116.	24492	*Hirundo nigricans subsp. nigricans*			
Hylidae					
117.	25378	*Litoria adelaidensis (Slender Tree Frog)*			
118.	25388	*Litoria moorei (Motorbike Frog)*			
Laridae					
119.	24506	*Anous tenuirostris subsp. melanops (Australian Lesser Noddy)*		T	
120.	24525	*Sterna fuscata subsp. nubilosa*			
121.	24530	*Sterna nereis subsp. nereis (Fairy Tern)*		T	
Limnodynastidae					
122.	25409	*Heleioporus barycragus (Hooting Frog)*			
123.	25410	*Heleioporus eyrei (Moaning Frog)*			
124.	25412	*Heleioporus psammophilus (Sand Frog)*			
125.	25415	*Limnodynastes dorsalis (Western Banjo Frog)*			
Macropodidae					
126.	24132	*Macropus fuliginosus (Western Grey Kangaroo)*			
127.	24133	*Macropus irma (Western Brush Wallaby)*		P4	
128.	24135	*Macropus robustus subsp. erubescens (Euro)*			
Maluridae					
129.	25651	*Malurus lamberti (Variegated Fairy-wren)*			
130.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
131.	25654	*Malurus splendens (Splendid Fairy-wren)*			
Meliphagidae					
132.	24559	*Acanthagenys rufogularis (Spiny-cheeked Honeyeater)*			
133.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
134.	24561	*Anthochaera carunculata (Red Wattlebird)*			
135.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
136.	24567	*Epthianura albifrons (White-fronted Chat)*			
137.	24581	*Lichenostomus virescens (Singing Honeyeater)*			
138.	25661	*Lichmera indistincta (Brown Honeyeater)*			
139.	25663	*Melithreptus brevirostris (Brown-headed Honeyeater)*			
140.	24586	*Melithreptus brevirostris subsp. leucogenys*			
141.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
Meropidae					
142.	24598	*Merops ornatus (Rainbow Bee-eater)*		IA	
Molossidae					
143.	24185	*Tadarida australis (White-striped Freetail-bat)*			
Muridae					
144.	24215	*Hydromys chrysogaster (Water-rat)*		P4	
145.	24223	*Mus musculus (House Mouse)*			
146.	24245	*Rattus rattus (Black Rat)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Myobatrachidae					
147.	25398	*Crinia georgiana (Quacking Frog)*			
148.	25399	*Crinia glauerti (Clicking Frog)*			
149.	25400	*Crinia insignifera (Squelching Froglet)*			
150.	25420	*Myobatrachus gouldii (Turtle Frog)*			
151.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
Myrmecobiidae					
152.	24146	*Myrmecobius fasciatus (Numbat)*		T	
Neosittidae					
153.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
154.	24606	*Daphoenositta chrysoptera subsp. pileata (Varied Sittella)*			
Pachycephalidae					
155.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
156.	25679	*Pachycephala pectoralis (Golden Whistler)*			
157.	24623	*Pachycephala pectoralis subsp. fuliginosa*			
158.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
159.	24624	*Pachycephala rufiventris subsp. rufiventris*			
Pardalotidae					
160.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
161.	25682	*Pardalotus striatus (Striated Pardalote)*			
Pelecanidae					
162.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
Peramelidae					
163.	24153	*Isoodon obesulus subsp. fusciventer (Quenda, Southern Brown Bandicoot)*		P5	
Petroicidae					
164.	24659	*Petroica goodenovii (Red-capped Robin)*			
165.	24660	*Petroica multicolor subsp. campbelli*			
Phalacrocoracidae					
166.	25697	*Phalacrocorax carbo (Great Cormorant)*			
167.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
168.	25699	*Phalacrocorax varius (Pied Cormorant)*			
169.	24668	*Phalacrocorax varius subsp. hypoleucos*			
Phalangeridae					
170.	24158	*Trichosurus vulpecula subsp. vulpecula (Common Brushtail Possum)*			
Phasianidae					
171.	24671	*Coturnix pectoralis (Stubble Quail)*			
Podargidae					
172.	25703	*Podargus strigoides (Tawny Frogmouth)*			
173.	24679	*Podargus strigoides subsp. brachypterus*			
Podicipedidae					
174.	25704	*Podiceps cristatus (Great Crested Grebe)*			
175.	24680	*Podiceps cristatus subsp. australis*			
176.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
177.	25705	*Tachybaptus novaehollandiae (Australasian Grebe)*			
178.	24682	*Tachybaptus novaehollandiae subsp. novaehollandiae*			
Procellariidae					
179.	24689	*Halobaena caerulea (Blue Petrel)*			
180.	24697	*Pachyptila vittata (Broad-billed Prion)*			
181.	24702	*Pterodroma brevirostris (Kerguelen Petrel)*			
182.	24703	*Pterodroma lessonii (White-headed Petrel)*			
Psittacidae					
183.	25713	*Cacatua galerita (Sulphur-crested Cockatoo)*			
184.	24721	*Cacatua galerita subsp. galerita*			
185.	25714	*Cacatua pastinator (Western Long-billed Corella)*			
186.	24723	*Cacatua pastinator subsp. butleri (Butler's Corella)*			
187.	24724	*Cacatua pastinator subsp. pastinator (Muir's Corella (Western Corella SW WA))*		T	
188.	25716	*Cacatua sanguinea (Little Corella)*			
189.	24729	*Cacatua tenuirostris (Eastern Long-billed Corella)*			
190.	25717	*Calyptorhynchus banksii (Red-tailed Black-Cockatoo)*			
191.	24731	*Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black-Cockatoo)*		T	
192.	24733	*Calyptorhynchus baudinii (Baudin's Cockatoo (long-billed black-cockatoo))*		T	
193.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo (short-billed black-cockatoo))*		T	
194.	30918	*Glossopsitta concinna (Musk Lorikeet)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
					Y
195.	24735	*Glossopsitta porphyrocephala (Purple-crowned Lorikeet)*			
196.	24736	*Melopsittacus undulatus (Budgerigar)*			
197.	24738	*Neophema elegans (Elegant Parrot)*			
198.	24742	*Nymphicus hollandicus (Cockatiel)*			
199.	25720	*Platycercus icterotis (Western Rosella)*			
200.	24747	*Platycercus spurius (Red-capped Parrot)*			
201.	25721	*Platycercus zonarius (Australian Ringneck)*			
202.	24750	*Platycercus zonarius subsp. semitorquatus (Twenty-eight Parrot)*			
203.	30854	*Polytelis anthopeplus subsp. westralis*			
204.	25723	*Trichoglossus haematodus (Rainbow Lorikeet)*			
Pygopodidae					
205.	24990	*Aprasia pulchella*			
206.	24991	*Aprasia repens*			
207.	25766	*Delma fraseri (Fraser's Legless Lizard)*			
208.	24999	*Delma grayii*			
209.	25005	*Lialis burtonis*			
210.	25007	*Pletholax gracilis subsp. gracilis*			
211.	25008	*Pygopus lepidopodus (Common Scaly Foot)*			
Rallidae					
212.	25727	*Fulica atra (Eurasian Coot)*			
213.	25729	*Gallinula tenebrosa (Dusky Moorhen)*			
214.	24764	*Gallinula ventralis (Black-tailed Native-hen)*			
215.	25730	*Gallirallus philippensis (Buff-banded Rail)*			
216.	24765	*Gallirallus philippensis subsp. mellori*			
217.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
218.	24767	*Porphyrio porphyrio subsp. bellus*			
219.	24769	*Porzana fluminea (Australian Spotted Crake)*			
220.	25732	*Porzana pusilla (Baillon's Crake)*			
221.	24770	*Porzana pusilla subsp. palustris*			
222.	24771	*Porzana tabuensis (Spotless Crake)*			
Recurvirostridae					
223.	24774	*Cladorhynchus leucocephalus (Banded Stilt)*			
224.	25734	*Himantopus himantopus (Black-winged Stilt)*			
Scincidae					
225.	25011	*Acritoscincus trilineatum*			
226.	30893	*Cryptoblepharus buchananii*			
227.	25027	*Ctenotus australis*			
228.	25039	*Ctenotus fallens*			
229.	25047	*Ctenotus impar*			
230.	25049	*Ctenotus labillardieri*			
231.	25098	*Egernia luctuosa (Western Swamp Skink)*			
232.	25475	*Hemiergis peronii*			
233.	25119	*Hemiergis quadrilineata*			
234.	25131	*Lerista distinguenda*			
235.	25133	*Lerista elegans*			
236.	25148	*Lerista lineopunctulata*			
237.	25165	*Lerista praepedita*			
238.	25184	*Menetia greyii*			
239.	25192	*Morethia obscura*			
240.	25203	*Tiliqua occipitalis (Western Bluetongue)*			
241.	25207	*Tiliqua rugosa subsp. rugosa*			
Sciuridae					
242.	30916	*Funambulus pennanti (Indian Palm Squirrel)*			
Scolopacidae					
243.	41323	*Actitis hypoleucos (Common Sandpiper)*		IA	
244.	24784	*Calidris ferruginea (Curlew Sandpiper)*		IA	
245.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
246.	24806	*Tringa glareola (Wood Sandpiper)*		IA	
247.	24808	*Tringa nebularia (Common Greenshank)*		IA	
Strigidae					
248.	25747	*Ninox connivens (Barking Owl)*			
249.	25748	*Ninox novaeseelandiae (Boobook Owl)*			
250.	24820	*Ninox novaeseelandiae subsp. boobook (Boobook Owl)*			
Sturnidae					
251.	25751	*Acridotheres tristis (Common Myna)*			Y

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Suidae					
252.	24259	*Sus scrofa (Pig)*			
Sylviidae					
253.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
254.	25758	*Megalurus gramineus (Little Grassbird)*			
Tachyglossidae					
255.	24207	*Tachyglossus aculeatus (Echidna)*			
Tarsipedidae					
256.	24167	*Tarsipes rostratus (Honey Possum)*			
Threskiornithidae					
257.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
258.	24844	*Threskiornis molucca (Australian White Ibis)*			
259.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
Turnicidae					
260.	24849	*Turnix varia subsp. varia*			
Typhlopidae					
261.	25271	*Ramphotyphlops australis*			
262.	25273	*Ramphotyphlops bituberculatus*			
263.	25312	*Ramphotyphlops braminus*			
264.	25285	*Ramphotyphlops pinguis*			
265.	25288	*Ramphotyphlops waitii*			
Tytonidae					
266.	24852	*Tyto alba subsp. delicatula (Barn Owl)*			
Varanidae					
267.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
268.	25227	*Varanus tristis subsp. tristis (Racehorse Monitor)*			
Vespertilionidae					
269.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
270.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
271.	24206	*Vespadelus regulus (Southern Forest Bat)*			
Zosteropidae					
272.	25765	*Zosterops lateralis (Grey-breasted White-eye)*			
273.	24856	*Zosterops lateralis subsp. gouldi*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

Appendix C — Conservation codes

Conservation categories & definitions for *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed flora & fauna species

Conservation category	Definition
Extinct	Taxa not definitely located in the wild during the past 50 years
Extinct in the Wild	Taxa known to survive only in captivity
Critically Endangered	Taxa facing an extremely high risk of extinction in the wild in the immediate future
Endangered	Taxa facing a very high risk of extinction in the wild in the near future
Vulnerable	Taxa facing a high risk of extinction in the wild in the medium-term
Near Threatened	Taxa that risk becoming Vulnerable in the wild
Conservation Dependent	Taxa whose survival depends upon ongoing conservation measures. Without these measures, a conservation dependent taxon would be classified as Vulnerable or more severely threatened.
Data Deficient (Insufficiently Known)	Taxa suspected of being Rare, Vulnerable or Endangered, but whose true status cannot be determined without more information.
Least Concern	Taxa that are not considered Threatened

Migratory Species listed under the EPBC Act

The EPBC Act protects lands and migratory species that are listed under International Agreements. The list of migratory species established under section 209 of the EPBC Act comprises:

- Migratory species which are native to Australia and are included in the appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II);
- Migatory species included in annexes established under the Japan-Australia Migratory Bird Agreement (JAMBA) and the China-Australia Migratory Bird Agreement (CAMBA); and
- Native, migratory species identified in a list established under, or an instrument made under, an international agreement approved by the Minister, such as the republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

Conservation codes and descriptions for Western Australian flora & fauna

Code	Conservation category	Description
Wildlife Conservation Act 1950		
T	Schedule 1 under the WC Act	Threatened Fauna (Fauna that is rare or is likely to become extinct Threatened Flora (Declared Rare Flora – Extant) Taxa that have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such. **CR:** Critically Endangered – considered to be facing an extremely high risk of extinction in the wild. **EN:** Endangered – considered to be facing a very high risk of extinction in the wild. **VU:** Vulnerable – considered to be facing a high risk of extinction in the wild.
X	Schedule 2 under the WC Act	Presumed Extinct Fauna Presumed Extinct Flora (Declared Rare Flora – Extinct) Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such.
IA	Schedule 3 under the WC Act	Birds protected under an international agreement. Birds that are subject to an agreement between governments of Australia and Japan relating to the protection of migratory birds and birds in danger of extinction.
S	Schedule 4 under the WC Act	Other specially protected fauna. Fauna that is in need of special protection, otherwise than for the reasons mentioned in the above schedules.
DPaW Priority Listed		
1	Priority One: Poorly-known taxa	Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
2	Priority Two: Poorly-known taxa	Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.

Code	Conservation category	Description
3	Priority Three: Poorly-known taxa	Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
4	Priority Four: Rare, Near Threatened and other taxa in need of monitoring	(a) Rare. Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands. (b) Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
5	Priority 5: Conservation Dependent taxa	Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxon becoming threatened within five years.

Department of Agriculture and Food (Western Australia) Categories for Declared Pests under the *Biosecurity and Agriculture Management Act 2007*.

Control class code	Description
C1 (Exclusion)	Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.
C2 (Eradication)	Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.
C3 (Management)	Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

Conservation codes & definitions for Threatened Ecological Communities (TEC) endorsed by the Western Australian Minister for the Environment & listed under the EPBC Act

Western Australia conservation categories		Federal Government Conservation Categories (EPBC Act)	
Presumed Totally Destroyed (PD)	The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.	Critically Endangered (CR)	If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated	Endangered (EN)	If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.	Vulnerable (VU)	If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.		

Conservation categories & definitions for Priority Ecological Communities (PEC) as listed by the DPaW

Category	Description
Priority 1	Poorly known ecological communities. Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
Priority 2	Poorly known ecological communities. Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
Priority 3	Poorly known ecological communities. (i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; (iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.
Priority 4	Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. (i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands. (ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (iii) Ecological communities that have been removed from the list of threatened communities during the past five years.

Category	Description
Priority 5	Conservation Dependent ecological communities. Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Appendix D — Flora data

Quadrat data & photographs

Species list

Flora likelihood of occurrence assessment

Quadrat data & photographs

Site	Q01	Project	Forrestfield Airport Link
Type:	Quadrat	**Size:**	10 × 10 m
Date:	17/09/2013	**Described by:**	AN & ML
Co-ordinates:	MGA 50	400,585 mE	6,466,289 mN
Location:	Swan River to Domestic Terminal		
Landform:	Flat		
Drainage:	Good drainage		
Soil colour & type:	Grey-brown sand		
Vegetation type:	Open Woodland of *Corymbia calophylla*, *Melaleuca preissiana* and *Banksia* spp. over *Xanthorrhoea preissii*, *Hypocalymma angustifolium* and *Dasypogon bromeliifolius*, *Pericalymma ellipticum* var. *ellipticum* and *Astartea scoparia*		
Vegetation condition:	Good (4) – Degraded (5)		
Fire age & intensity:	Old (>5 years), no damage		
Disturbances:	Clearing, exotic weeds, animal		
Bare ground (%):	<2	**Logs (%):**	2-10
Twigs (%):	10-30	**Leaves (%):**	30-70
Rocks <2 cm (%):	<2	**Rocks 2-30 cm (%):**	<2
Rocks >30 cm (%):	<2	**Veg. ground layer (%):**	70-100

Species list

Family	Species	Status	Stratum	Cover (%)	Height (m)
Myrtaceae	*Corymbia calophylla*		U1	30-70	12
Loranthaceae	*Nuytsia floribunda*		M1	2-10	3
Fabaceae	*Chamaecytisus palmensis*		M2	<2	1.5
Proteaceae	*Banksia menziesii*		M2	<2	1.6
Poaceae	*Ehrharta calycina*	*	M3	30-70	0.8
Loranthaceae	*Nuytsia floribunda*		M3	<2	0.5
Ericaceae	*Conostephium pendulum*		M3	<2	0.5
Malvaceae	*Brachychiton* sp.	*	M3	<2	0.4
Iridaceae	*Watsonia* sp.	*	M3	<2	0.7
Iridaceae	*Freesia alba* x *leichtlinii*	*	G1	70-100	0.2
Oxalidaceae	*Oxalis pes-caprae*	*	G1	2-10	0.1
Asparagaceae	*Sowerbaea laxiflora*		G1	<2	0.3
Colchicaceae	*Burchardia congesta*		G1	<2	0.3
Iridaceae	*Patersonia* sp.		G1	<2	0.3
Xanthorrhoeaceae	*Xanthorrhoea* sp.		G1	<2	0.3
Dasypogonaceae	*Dasypogon bromeliifolius*		G1	<2	0.2
Orchidaceae	*Caladenia latifolia*		G1	<2	0.1

Site	Q02	Project	Forrestfield Airport Link
Type:	Quadrat	**Size:**	10 × 10 m
Date:	17/09/2013	**Described by:**	AN & ML
Co-ordinates:	MGA 50	400,652 mE	6,466,221 mN
Location:	Swan River to Domestic Terminal		
Landform:	Drainage depression		
Drainage:	Good drainage		
Soil colour & type:	Brown sand		
Vegetation type:	Open Woodland of *Corymbia calophylla*, *Melaleuca preissiana* and *Banksia* spp. over *Xanthorrhoea preissii*, *Hypocalymma angustifolium* and *Dasypogon bromeliifolius*, *Pericalymma ellipticum* var. *ellipticum* and *Astartea scoparia*		
Vegetation condition:	Degraded (5)		
Fire age & intensity:	Old (>5 years), no damage		
Disturbances:	Exotic weeds, animal		
Bare ground (%):	<2	**Logs (%):**	<2
Twigs (%):	10-30	**Leaves (%):**	30-70
Rocks <2 cm (%):	<2	**Rocks 2-30 cm (%):**	<2
Rocks >30 cm (%):	<2	**Veg. ground layer (%):**	70-100

Species list

Family	Species	Status	Stratum	Cover (%)	Height (m)
Myrtaceae	*Corymbia calophylla*		U1	70-100	14
Myrtaceae	*Eucalyptus rudis*		U2	2-10	9
Myrtaceae	*Eucalyptus rudis*		U3	<2	1.5
Myrtaceae	*Corymbia calophylla*		U3	<2	1.5
Iridaceae	*Watsonia* sp.	*	G1	70-100	0.8
Cyperaceae	*Lepidosperma* sp.		G1	<2	0.5

Site	Q03	Project	Forrestfield Airport Link
Type:	Quadrat	**Size:**	10 × 10 m
Date:	17/09/2013	**Described by:**	AN & ML
Co-ordinates:	MGA 50	400,825 mE	6,466,354 mN
Location:	Swan River to Domestic Terminal		
Landform:	Drainage depression		
Drainage:	Good drainage		
Soil colour & type:	White-grey sand		
Vegetation type:	Open Woodland of *Corymbia calophylla*, *Melaleuca preissiana* and *Banksia* spp. over *Xanthorrhoea preissii*, *Hypocalymma angustifolium* and *Dasypogon bromeliifolius*, *Pericalymma ellipticum* var. *ellipticum* and *Astartea scoparia*		
Vegetation condition:	Excellent (2) – Very Good (3)		
Fire age & intensity:	Old (>5 years), no damage		
Disturbances:	Clearing, exotic weeds, animal		
Bare ground (%):	10-30	**Logs (%):**	<2
Twigs (%):	<2	**Leaves (%):**	2-10
Rocks <2 cm (%):	<2	**Rocks 2-30 cm (%):**	<2
Rocks >30 cm (%):	<2	**Veg. ground layer (%):**	70-100

Species list

Family	Species	Status	Stratum	Cover (%)	Height (m)
Myrtaceae	*Melaleuca preissiana*		U1	2-10	5
Myrtaceae	*Pericalymma ellipticum*		M1	2-10	0.6

Family	Species	Status	Stratum	Cover (%)	Height (m)
Fabaceae	*Gompholobium tomentosum*		M1	2-10	0.6
Myrtaceae	*Hypocalymma angustifolium*		M1	2-10	0.5
Dasypogonaceae	*Dasypogon bromeliifolius*		G1	30-70	0.4
Haemodoraceae	*Phlebocarya ciliata*		G1	2-10	0.4
Iridaceae	*Patersonia occidentalis*		G1	2-10	0.4
Poaceae	*Ehrharta calycina*	*	G1	2-10	0.4
Haemodoraceae	*Haemodorum spicatum*		G1	<2	0.3
Anarthriaceae	*Lyginia imberbis*		G1	<2	0.3
Iridaceae	*Gladiolus caryophyllaceus*	*	G1	<2	0.5
Restionaceae	*Hypolaena exsulca*		G1	<2	0.5
	Mixed weedy herbs & grasses	*	G2	2-10	0.05
Colchicaceae	*Burchardia congesta*		G2	<2	0.2
Droseraceae	*Drosera* sp.		G2	<2	climbing
Droseraceae	*Drosera glanduligera*		G2	<2	prostrate

Site	Q04	Project	Forrestfield Airport Link
Type:	Quadrat	**Size:**	10 × 10 m
Date:	17/09/2013	**Described by:**	AN & ML
Co-ordinates:	MGA 50	400,401 mE	6,466,020 mN
Location:	Swan River to Domestic Terminal		
Landform:	Flat		
Drainage:	Good drainage		
Soil colour & type:	Grey sand		
Vegetation type:	Low Open Woodland of remnant *Eucalyptus marginata* and *Banksia* spp. over a native mid-storey of mixed native species and an understorey of either mixed native species or weedy grasses and herbs		
Vegetation condition:	Excellent (2) – Very Good (3)		
Fire age & intensity:	Old (>5 years), no damage		
Disturbances:	Clearing, exotic weeds, animals		
Bare ground (%):	2-10	**Logs (%):**	<2
Twigs (%):	2-10	**Leaves (%):**	30-70
Rocks <2 cm (%):	<2	**Rocks 2-30 cm (%):**	<2
Rocks >30 cm (%):	<2	**Veg. ground layer (%):**	10-30

Species list

Family	Species	Status	Stratum	Cover (%)	Height (m)
Myrtaceae	*Eucalyptus marginata*		U1	2-10	12
Proteaceae	*Banksia menziesii*		U2	10-30	6
Proteaceae	*Banksia grandis*		U2	<2	2.5
Myrtaceae	*Calytrix* sp.		M1	10-30	1.6
Dilleniaceae	*Hibbertia hypericoides*		M2	30-70	0.5
Cyperaceae	*Mesomelaena pseudostygia*		M2	2-10	0.6
Poaceae	*Ehrharta calycina*	*	M2	2-10	0.6
Fabaceae	*Gompholobium tomentosum*		M2	<2	0.6
Cyperaceae	*Lepidosperma longitudinale*		M2	<2	0.5
Ericaceae	*Conostephium pendulum*		M2	<2	0.5
Proteaceae	*Stirlingia latifolia*		M2	<2	0.5
Fabaceae	*Bossiaea eriocarpa*		M2	<2	0.3
Fabaceae	*Daviesia divaricata*		M2	<2	0.3
Fabaceae	*Daviesia nudiflora*		M2	<2	0.3
Proteaceae	*Petrophile linearis*		M2	<2	0.2
Asparagaceae	*Sowerbaea laxiflora*		G1	<2	0.3
Colchicaceae	*Burchardia congesta*		G1	<2	0.3
Haemodoraceae	*Conostylis aculeata*		G1	<2	0.2
Haemodoraceae	*Haemodorum laxum*		G1	<2	0.2
Hemerocallidaceae	*Johnsonia ?pubescens*		G1	<2	0.2
Goodeniaceae	*Dampiera linearis*		G1	<2	0.1
Asparagaceae	*Thysanotus manglesianus/ patersonii* complex		G2	<2	climbing
Araliaceae	*Trachymene pilosa*		G2	<2	0.05
Iridaceae	*Romulea rosea*	*	G2	<2	0.05
Poaceae	*Briza maxima*	*	G2	<2	0.05
Droseraceae	*Drosera erythrorhiza*		G2	2-10	prostrate
Asteraceae	*Hypochaeris* sp.		G2	<2	prostrate

Site	Q05	Project	Forrestfield Airport Link
Type:	Quadrat	**Size:**	10 × 10 m
Date:	17/09/2013	**Described by:**	AN & ML
Co-ordinates:	MGA 50	404,923 mE	6,464,720 mN
Location:	High Wycombe		
Landform:	Flat		
Drainage:	Good drainage		
Soil colour & type:	Grey sand		
Vegetation type:	Remnant *Eucalyptus marginata*/*E. rudis*/*Corymbia calophylla* Woodland over a mid-storey and understorey of mixed native species		
Vegetation condition:	Excellent (2) – Very Good (3)		
Fire age & intensity:	Old (>5 years), no damage		
Disturbances:	Clearing, exotic weeds, animal		
Bare ground (%):	<2	**Logs (%):**	2-10
Twigs (%):	30-70	**Leaves (%):**	70-100
Rocks <2 cm (%):	<2	**Rocks 2-30 cm (%):**	<2
Rocks >30 cm (%):	<2	**Veg. ground layer (%):**	30-70

Species list

Family	Species	Status	Stratum	Cover (%)	Height (m)
Myrtaceae	*Corymbia calophylla*		U1	10-30	12
Casuarinaceae	*Allocasuarina fraseriana*		U2	10-30	6
Proteaceae	*Hakea ruscifolia*		M1	<2	1.5
Fabaceae	*Acacia saligna*		M1	<2	1.5
Proteaceae	*Conospermum undulatum*	Threatened (State), Vulnerable (Federal)	M1	<2	1.5
Proteaceae	*Stirlingia latifolia*		M2	2-10	0.8
Iridaceae	*Gladiolus caryophyllaceus*	*	M2	<2	0.8
Violaceae	*Hybanthus calycinus*		G1	10-30	0.3
Poaceae	*Ehrharta calycina*	*	G1	2-10	0.6
Proteaceae	*Banksia dallanneyi*		G1	2-10	0.4
Asparagaceae	*Lomandra* sp.		G1	<2	0.3
Colchicaceae	*Burchardia congesta*		G1	<2	0.3
Cyperaceae	*Lepidosperma* sp.		G1	<2	0.3
Cyperaceae	*Tetraria octandra*		G1	<2	0.3
Fabaceae	*Hovea trisperma*		G1	<2	0.3
Haemodoraceae	*Haemodorum* sp.		G1	<2	0.3
Dilleniaceae	*Hibbertia hypericoides*		G1	<2	0.2
Fabaceae	*Acacia sessilis*		G1	<2	0.2
Fabaceae	*Labichea punctata*		G1	<2	0.1
Restionaceae	*Desmocladus flexuosus*		G1	<2	0.1
Pittosporaceae	*Billardiera* sp.		G1	<2	creeper
Droseraceae	*Drosera erythrorhiza*		G2	2-10	prostrate
Orchidaceae	*Caladenia arenicola*		G2	<2	0.3
Goodeniaceae	*Dampiera linearis*		G2	<2	0.1
Araliaceae	*Trachymene pilosa*		G2	<2	0.05

Site	Q06	Project	Forrestfield Airport Link
Type:	Quadrat	**Size:**	10 × 10 m
Date:	17/09/2013	**Described by:**	AN & ML
Co-ordinates:	MGA 50	404,711 mE	6;463;786 mN
Location:	High Wycombe		
Landform:	Flat		
Drainage:	Good drainage		
Soil colour & type:	White-grey sand		
Vegetation type:	Sparse Woodland of *Corymbia calophylla* over *Xanthorrhoea preissii* and low shrubs, sedges and herbs		
Vegetation condition:	Very Good (3) – Good (4)		
Fire age & intensity:	Old (>5 years), minor impact, scars on some trees		
Disturbances:	Clearing, infrastructure nearby, exotic weeds, animal		
Bare ground (%):	2-10	**Logs (%):**	2-10
Twigs (%):	<2	**Leaves (%):**	2-10
Rocks <2 cm (%):	<2	**Rocks 2-30 cm (%):**	<2
Rocks >30 cm (%):	<2	**Veg. ground layer (%):**	70-100

Species list

Family	Species	Status	Stratum	Cover (%)	Height (m)
Loranthaceae	*Nuytsia floribunda*		U1	2-10	6
Poaceae	*Ehrharta calycina*	*	M1	10-30	0.8
Dilleniaceae	*Hibbertia hypericoides*		M1	10-30	0.5
Haemodoraceae	*Anigozanthos manglesii*		M1	2-10	0.8
Proteaceae	*Stirlingia latifolia*		M1	2-10	0.5
Xanthorrhoeaceae	*Xanthorrhoea* sp.		M1	2-10	0.5
Proteaceae	*Petrophile linearis*		M1	2-10	0.3
Proteaceae	*Persoonia saccata*		M1	<2	0.5
Ericaceae	*Conostephium pendulum*		M1	<2	0.3
Proteaceae	*Synaphea ?spinulosa*		M1	<2	0.3
Asparagaceae	*Thysanotus manglesianus/ patersonii* complex		M1	<2	climbing
Dasypogonaceae	*Dasypogon bromeliifolius*		G1	2-10	0.5
Anarthriaceae	*Lyginia imberbis*		G1	<2	0.5
Haemodoraceae	*Haemodorum* sp.		G1	<2	0.5
Cyperaceae	*Mesomelaena pseudostygia*		G1	<2	0.3
Dasypogonaceae	*Calectasia narragara*		G1	<2	0.3
Restionaceae	*Hypolaena exsulca*		G1	<2	0.3
Rutaceae	*Boronia ramosa*		G1	<2	0.3
Haemodoraceae	*Conostylis juncea*		G2	<2	0.1
Asteraceae	*Ursinia anthemoides*	*	G2	<2	0.05
Restionaceae	*Loxocarya cinerea*		G2	<2	0.05
Asteraceae	*Hypochaeris* sp.		G2	<2	prostrate

Site	Q07	Project	Forrestfield Airport Link
Type:	Quadrat	**Size:**	10 × 10 m
Date:	17/09/2013	**Described by:**	AN & ML
Co-ordinates:	MGA 50	404,724 mE	6,464,018 mN
Location:	High Wycombe		
Landform:	Flat		
Drainage:	Good drainage		
Soil colour & type:	Grey-white sand		
Vegetation type:	Sparse Woodland of *Corymbia calophylla* over *Xanthorrhoea preissii* and low shrubs, sedges and herbs		
Vegetation condition:	Excellent (2)		
Fire age & intensity:	Old (>5 years), no damage		
Disturbances:	Clearing, infrastructure, exotic weeds, animal		
Bare ground (%):	2-10	**Logs (%):**	<2
Twigs (%):	<2	**Leaves (%):**	2-10
Rocks <2 cm (%):	<2	**Rocks 2-30 cm (%):**	<2
Rocks >30 cm (%):	<2	**Veg. ground layer (%):**	70-100

Species list

Family	Species	Status	Stratum	Cover (%)	Height (m)
Myrtaceae	*Leptospermum laevigatum*	*	M1	2-10	5
Cyperaceae	*Cyathochaeta avenacea*		M2	2-10	0.9
Cyperaceae	*Mesomelaena tetragona*		M2	2-10	0.5
Dilleniaceae	*Hibbertia hypericoides*		M2	2-10	0.5
Fabaceae	*Daviesia physodes*		M2	2-10	0.4
Poaceae	*Ehrharta calycina*	*	M2	<2	0.8
Fabaceae	*Gompholobium tomentosum*		M2	<2	0.4
Fabaceae	*Bossiaea eriocarpa*		M2	<2	0.3
Proteaceae	*Stirling latifolia*		M2	<2	0.3
Lauraceae	*Cassytha* sp.		M2	<2	climbing
Iridaceae	*Patersonia occidentalis*		M2	<2	0.5
Dasypogonaceae	*Dasypogon bromeliifolius*		G1	10-30	0.4
Haemodoraceae	*Anigozanthos manglesii*		G1	2-10	0.9
Xanthorrhoeaceae	*Xanthorrhoea* sp.		G1	2-10	0.9
Restionaceae	*Loxocarya cinerea*		G1	2-10	0.05
Asteraceae	*Tagetes minuta*	*	G1	<2	0.5
Colchicaceae	*Burchardia congesta*		G1	<2	0.3
Asparagaceae	*Lomandra* sp.		G1	<2	0.2
Asparagaceae	*Chamaescilla corymbosa*		G1	<2	0.1
Asteraceae	*Ursinia anthemoides*	*	G1	<2	0.1
Fabaceae	*Acacia applanata*		G1	<2	0.1
Fabaceae	*Acacia sessilis*		G1	<2	0.1
Orchidaceae	*Caladenia flava*		G1	<2	0.1
Proteaceae	*Banksia dallanneyi*		G1	<2	0.1
Restionaceae	*Desmocladus fascicularis*		G1	<2	0.1
Haemodoraceae	*Conostylis aculeata*		G1	<2	0.05
Haemodoraceae	*Conostylis setigera*		G1	<2	0.05
Droseraceae	*Drosera* sp.		G1	<2	climbing
Cyperaceae	*Caustis dioica*		G2	2-10	0.1
Goodeniaceae	*Scaevola repens*		G2	<2	0.05
Asteraceae	*Hypochaeris* sp.		G2	<2	prostrate

Site	Q08	Project	Forrestfield Airport Link
Type:	Quadrat	**Size:**	10 × 10 m
Date:	17/09/2013	**Described by:**	AN & ML
Co-ordinates:	MGA 50	405,081 mE	6,464,531 mN
Location:	High Wycombe		
Landform:	Creek bank		
Drainage:	Good drainage		
Soil colour & type:	Grey sand		
Vegetation type:	Remnant *Eucalyptus marginata*/*E. rudis*/*Corymbia calophylla* Woodland over a mid-storey and understorey of mixed native species		
Vegetation condition:	Very Good (3)		
Fire age & intensity:	Old (>5 years), no damage		
Disturbances:	Clearing, exotic weeds, animal		
Bare ground (%):	<2	**Logs (%):**	<2
Twigs (%):	10-30	**Leaves (%):**	30-70
Rocks <2 cm (%):	<2	**Rocks 2-30 cm (%):**	<2
Rocks >30 cm (%):	<2	**Veg. ground layer (%):**	10-30

Species list

Family	Species	Status	Stratum	Cover (%)	Height (m)
Myrtaceae	*Corymbia calophylla*		U1	30-70	15
Casuarinaceae	*Allocasuarina fraseriana*		U2	2-10	7
Malvaceae	*Thomasia macrocarpa*		M1	30-70	2.2
Rhamnaceae	*Trymalium odoratissimum*		M1	30-70	2.5
Proteaceae	*Hakea lissocarpha*		M2	2-10	0.7
Poaceae	*Ehrharta calycina*		G1	2-10	0.5
Iridaceae	*Watsonia* sp.		G1	<2	0.4
Cyperaceae	*Lepidosperma gladiatum*		G1	<2	0.3
Hemerocallidaceae	*Tricoryne elatior*		G1	<2	0.2
Fabaceae	*Hovea trisperma*		G1	<2	0.1

Site	PP01	Project	Forrestfield Airport Link
Type:	Quadrat	**Size:**	10 × 10 m
Date:	17/09/2013	**Described by:**	AN & ML
Co-ordinates:	MGA 50	400,419 mE	6,465,983 mN
Location:	High Wycombe		
Landform:	Flat		
Drainage:	Good drainage		
Soil colour & type:	Grey sand		
Vegetation type:	Low Open Woodland of remnant *Eucalyptus marginata* and *Banksia* spp. over a native mid-storey of mixed native species and an understorey of either mixed native species or weedy grasses and herbs		
Vegetation condition:	Very Good (3)		
Fire age & intensity:	Old (>5 years), no damage		
Disturbances:	Clearing, exotic weeds, animal		
Bare ground (%):	<2	**Logs (%):**	<2
Twigs (%):	10-30	**Leaves (%):**	30-70
Rocks <2 cm (%):	<2	**Rocks 2-30 cm (%):**	<2
Rocks >30 cm (%):	<2	**Veg. ground layer (%):**	30-70

Flora species identified within the Study Area

Family	Taxa	Status
Agapanthaceae	*Agapanthus* sp.	*
Anacardiaceae	*Schinus terebinthifolius*	*
Anarthriaceae	*Lyginia imberbis*	
Apiaceae	*Xanthosia candida*	
Apiaceae	*Xanthosia huegelii*	
Araliaceae	*Trachymene pilosa*	
Arecaceae	Palm	*
Asparagaceae	*Asparagus declinatus*	*
Asparagaceae	*Chamaescilla corymbosa*	
Asparagaceae	*Laxmannia ramosa*	
Asparagaceae	*Lomandra micrantha*	
Asparagaceae	*Lomandra preissii*	
Asparagaceae	*Lomandra purpurea*	
Asparagaceae	*Lomandra* sp.	
Asparagaceae	*Sowerbaea laxiflora*	
Asparagaceae	*Thysanotus manglesianus /patersonii* complex	
Asparagaceae	*Thysanotus multiflorus*	
Asteraceae	*Arctotheca calendula*	*
Asteraceae	*Cotula* sp.	*
Asteraceae	*Dimorphotheca ecklonis*	*
Asteraceae	*Hypochaeris* sp.	
Asteraceae	*Podotheca gnaphalioides*	
Asteraceae	*Sonchus* sp.	*
Asteraceae	*Tagetes minuta*	*
Asteraceae	*Ursinia anthemoides*	*
Asteraceae	*Verbesina encelioides*	*
Brassicaceae	*Brassica tournefortii*	*
Cactaceae	*Opuntia stricta*	*
Caryophyllaceae	*Petrorhagia dubia*	*
Casuarinaceae	*Allocasuarina fraseriana*	
Casuarinaceae	*Allocasuarina humilis*	
Casuarinaceae	*Casuarina obesa*	
Colchicaceae	*Burchardia congesta*	
Crassulaceae	*Crassula* sp.	*
Cupressaceae	*Callitris preissii*	planted
Cyperaceae	*Caustis dioica*	
Cyperaceae	*Cyathochaeta avenacea*	
Cyperaceae	*Ficinia nodosa*	
Cyperaceae	*Lepidosperma gladiatum*	
Cyperaceae	*Lepidosperma leptostachyum*	
Cyperaceae	*Lepidosperma longitudinale*	
Cyperaceae	*Lepidosperma* sp.	
Cyperaceae	*Mesomelaena pseudostygia*	
Cyperaceae	*Mesomelaena tetragona*	
Cyperaceae	*Schoenus ?brevisetis*	
Cyperaceae	*Tetraria octandra*	
Dasypogonaceae	*Calectasia narragara*	
Dasypogonaceae	*Dasypogon bromeliifolius*	
Dilleniaceae	*Hibbertia huegelii*	
Dilleniaceae	*Hibbertia hypericoides*	
Dilleniaceae	*Hibbertia subvaginata*	
Droseraceae	*Drosera erythrorhiza*	
Droseraceae	*Drosera glanduligera*	
Droseraceae	*Drosera* sp.	
Ericaceae	*Conostephium pendulum*	
Euphorbiaceae	*Euphorbia terracina*	*
Euphorbiaceae	*Ricinis communis*	*
Fabaceae	*Acacia alata*	

Flora species identified within the Study Area

Family	Taxa	Status
Fabaceae	*Acacia applanata*	
Fabaceae	*Acacia longifolia*	*
Fabaceae	*Acacia pulchella* var. *pulchella*	
Fabaceae	*Acacia saligna*	
Fabaceae	*Acacia sessilis*	
Fabaceae	*Bossiaea eriocarpa*	
Fabaceae	*Chamaecytisus palmensis*	*
Fabaceae	*Daviesia angulata*	
Fabaceae	*Daviesia decurrens*	
Fabaceae	*Daviesia divaricata*	
Fabaceae	*Daviesia nudiflora*	
Fabaceae	*Daviesia physodes*	
Fabaceae	*Gastrolobium capitatum*	
Fabaceae	*Gompholobium aristatum*	
Fabaceae	*Gompholobium tomentosum*	
Fabaceae	*Hovea trisperma*	
Fabaceae	*Jacksonia floribunda*	
Fabaceae	*Jacksonia furcellata*	
Fabaceae	*Kennedia coccinea*	
Fabaceae	*Kennedia prostrata*	
Fabaceae	*Labichea punctata*	
Fabaceae	*Lupinus angustifolius*	*
Fabaceae	*Lupinus cosentinii*	*
Fabaceae	*Lupinus luteus*	*
Fabaceae	*Ornithopus sativus*	*
Fabaceae	*Trifolium angustifolium*	*
Fabaceae	*Trifolium arvense*	*
Fabaceae	*Trifolium campestre*	*
Geraniaceae	*Pelargonium capitatum*	*
Goodeniaceae	*Dampiera linearis*	
Goodeniaceae	*Lechenaultia biloba*	
Goodeniaceae	*Scaevola canescens*	
Goodeniaceae	*Scaevola repens*	
Haemodoraceae	*Anigozanthos humilis*	
Haemodoraceae	*Anigozanthos manglesii*	
Haemodoraceae	*Conostylis aculeata*	
Haemodoraceae	*Conostylis juncea*	
Haemodoraceae	*Conostylis setigera*	
Haemodoraceae	*Haemodorum laxum*	
Haemodoraceae	*Haemodorum* sp.	
Haemodoraceae	*Haemodorum spicatum*	
Haemodoraceae	*Phlebocarya ciliata*	
Hemerocallidaceae	*Agrostocrinum hirsutum*	
Hemerocallidaceae	*Agrostocrinum scabrum*	
Hemerocallidaceae	*Caesia micrantha*	
Hemerocallidaceae	*Dianella revoluta*	
Hemerocallidaceae	*Johnsonia ?pubescens*	
Hemerocallidaceae	*Tricoryne elatior*	
Iridaceae	*Freesia alba* x *leichtlinii*	*
Iridaceae	*Gladiolus caryophyllaceus*	*
Iridaceae	*Moraea* sp.	*
Iridaceae	*Patersonia occidentalis*	
Iridaceae	*Patersonia* sp.	
Iridaceae	*Romulea rosea*	*
Iridaceae	*Watsonia* sp.	*
Juncaceae	*Juncus pallidus*	
Juncaceae	*Juncus* sp.	
Lauraceae	*Cassytha* sp.	

Flora species identified within the Study Area

Family	Taxa	Status
Loranthaceae	*Nuytsia floribunda*	
Malvaceae	*Brachychiton* sp.	*
Malvaceae	*Malva parviflora*	*
Malvaceae	*Thomasia macrocarpa*	
Moraceae	*Ficus* sp.	*
Myrtaceae	*Astartea scoparia*	
Myrtaceae	*Babingtonia camphorosmae*	
Myrtaceae	*Callistemon* cultivar	*
Myrtaceae	*Calothamnus ?rupestris*	P4, planted
Myrtaceae	*Calothamnus quadrifidus* subsp. *quadrifidus*	
Myrtaceae	*Calytrix* sp.	
Myrtaceae	*Corymbia calophylla*	
Myrtaceae	*Corymbia maculata*	*
Myrtaceae	*Eucalyptus camaldulensis*	planted
Myrtaceae	*Eucalytpus caesia*	P4, planted
Myrtaceae	*Eucalyptus gomphocephala*	
Myrtaceae	*Eucalyptus marginata*	
Myrtaceae	*Eucalyptus rudis*	
Myrtaceae	*Eucalyptus todtiana*	
Myrtaceae	*Hypocalymma angustifolium*	
Myrtaceae	*Kunzea micrantha*	
Myrtaceae	*Leptospermum laevigatum*	*
Myrtaceae	*Melaleuca cuticularis*	
Myrtaceae	*Melaleuca preissiana*	
Myrtaceae	*Melaleuca rhaphiophylla*	
Myrtaceae	*Melaleuca seriata*	
Myrtaceae	*Pericalymma ellipticum*	
Myrtaceae	*Scholtzia involucrata*	
Oleaceae	*Olea europaea*	*
Orchidaceae	*Caladenia arenicola*	
Orchidaceae	*Caladenia flava*	
Orchidaceae	*Caladenia latifolia*	
Orchidaceae	*Pterostylis ?sanguinea*	
Orchidaceae	*Pterostylis* sp.	
Orchidaceae	*Thelymitra crinita*	
Oxalidaceae	*Oxalis pes-caprae*	*
Papaveraceae	*Fumaria capreolata*	*
Phytolaccaceae	*Phytolacca octandra*	*
Pittosporaceae	*Billardiera* sp.	
Poaceae	*Arundo donax*	*
Poaceae	*Avena barbata*	*
Poaceae	*Briza maxima*	*
Poaceae	*Bromus diandrus*	*
Poaceae	*Ehrharta calycina*	*
Poaceae	*Ehrharta longiflora*	*
Poaceae	*Lagurus ovatus*	*
Poaceae	*Stenotaphrum secundatum*	*
Poaceae	*Triticum aestivum*	*
Primulaceae	*Lysimachia arvensis*	*
Proteaceae	*Adenanthos cygnorum*	
Proteaceae	*Banksia attenuata*	
Proteaceae	*Banksia dallanneyi*	
Proteaceae	*Banksia grandis*	
Proteaceae	*Banksia menziesii*	
Proteaceae	*Banksia sessilis*	
Proteaceae	*Conospermum stoechadis*	
Proteaceae	*Conospermum undulatum*	T, V
Proteaceae	*Grevillea bipinnatifida*	

Flora species identified within the Study Area

Family	Taxa	Status
Proteaceae	*Hakea lissocarpha*	
Proteaceae	*Hakea prostrata*	
Proteaceae	*Hakea ruscifolia*	
Proteaceae	*Hakea trifurcata*	
Proteaceae	*Hakea undulata*	
Proteaceae	*Hakea varia*	
Proteaceae	*Persoonia saccata*	
Proteaceae	*Petrophile linearis*	
Proteaceae	*Stirlingia latifolia*	
Proteaceae	*Synaphea ?spinulosa*	
Restionaceae	*Alexgeorgea nitens*	
Restionaceae	*Desmocladus fascicularis*	
Restionaceae	*Desmocladus flexuosus*	
Restionaceae	*Hypolaena exsulca*	
Restionaceae	*Loxocarya cinerea*	
Rhamnaceae	*Trymalium odoratissimum*	
Rutaceae	*Boronia ramosa*	
Rutaceae	*Philotheca spicata*	
Sapinidaceae	*Diplopeltis huegelii*	
Scrophulariaceae	*Dischisma capitatum*	*
Stylidiaceae	*Stylidium calcaratum*	
Thymelaeaceae	*Pimelea ?imbricata*	
Thymelaeaceae	*Pimelea* sp.	
Tropaeolaceae	*Tropaeolum majus*	*
Violaceae	*Hybanthus calycinus*	
Xanthorrhoeaceae	*Xanthorrhoea gracilis*	
Xanthorrhoeaceae	*Xanthorrhoea preissii*	
Xanthorrhoeaceae	*Xanthorrhoea* sp.	
Zamiaceae	*Macrozamia fraseri*	
	Mixed weedy herbs & grasses	*

* Introduced species
P4 Department of Parks and Wildlife Priority 4
T, V State Threatened, Federal Vulnerable

Conservation codes are provided in Appendix C.

Flora likelihood of occurrence assessment for species potentially occurring within the Study Area

Family	Scientific name	Common name	Status		Source			Description and habitat requirements*	Likelihood of occurrence
			State	Federal	EPBC search	NatureMap Search	DEFL/WAHERB		
Apiaceae	*Eryngium subdecumbens*		P3			×		Prostrate perennial, herb, to 0.15 m high. Fl. white-green, Oct to Nov. Clay, grey sand. Seasonally wet flats, claypans, swamps.	Unlikely.
Apiaceae	*Platysace ramosissima*		P3			×	×	Perennial, herb, to 0.3 m high. Fl. white-cream, Oct to Nov. Sandy soils.	Possible.
Araliaceae	*Hydrocotyle lemnoides*	Aquatic Pennywort	P4			×	×	Aquatic, floating annual, herb. Fl. purple, Aug to Oct. Swamps.	Possible.
Araliaceae	*Hydrocotyle striata*		P1			×	×	Herb. Clay. Springs.	Possible.
Asparagaceae	*Thysanotus anceps*		P3			×		Rhizomatous, leafless perennial, herb, to 0.4 m high. Fl. purple, Oct to Dec. White or grey sand, lateritic gravel, laterite.	Possible.
Asteraceae	*Senecio gilbertii*		P1			×	×	Erect, slender perennial, herb, to 1.5 m high. Fl. yellow, Sep to Nov. Peaty sand. Swamps, slopes.	Unlikely.
Boraginaceae	*Halgania corymbosa*		P3			×	×	Erect shrub, 0.35-1 m high. Fl. blue-purple, Aug to Nov. Gravelly soils, soils over granite.	Possible.
Byblidaceae	*Byblis gigantea*	Rainbow Plant	P3			×	×	Small, branched perennial, herb (or sub-shrub), to 0.45 m high. Fl. pink-purple/white, Sep to Dec or Jan. Sandy-peat swamps. Seasonally wet areas.	Possible.
Centrolepidaceae	*Centrolepis caespitosa*		P4	E	×			Tufted annual, herb (forming a rounded cushion up to 25 mm across). Fl. Oct to Dec. White sand, clay. Salt flats, wet areas.	Unlikely.
Cyperaceae	*Bolboschoenus medianus*		P1			×	×	Rhizomatous, perennial, grass-like or herb (sedge). Fl. red-brown. Mud. In water and on river banks.	Possible.
Cyperaceae	*Carex tereticaulis*		P1				×	Monoecious, rhizomatous, tufted perennial, grass-like or herb (sedge), 0.7 m high. Fl. brown, Sep to Oct. Black peaty sand.	Unlikely.
Cyperaceae	*Cyathochaeta teretifolia*		P3			×	×	Rhizomatous, clumped, robust perennial, grass-like or herb (sedge), to 2 m high, to 1.0 m wide. Fl. brown. Grey sand, sandy clay. Swamps, creek edges.	Possible.
Cyperaceae	*Lepidosperma rostratum*	Beaked Lepidosperma	T	E	×			Rhizomatous, tufted perennial, grass-like or herb (sedge), 0.5 m high. Fl. brown. Peaty sand, clay.	Unlikely.
Cyperaceae	*Schoenus griffinianus*		P3			×	×	Small, tufted perennial, grass-like or herb (sedge), to 0.1 m high. Fl. Sep to Oct. White sand.	Possible.
Cyperaceae	*Schoenus pennisetis*		P1			×	×	Tufted annual, grass-like or herb (sedge), 0.05-0.15 m high. Fl. purple-black, Aug to Sep. Grey or peaty sand, sandy clay. Swamps, winter-wet depressions.	Possible.
Elaeocarpaceae	*Tetratheca* sp. Granite (S. Patrick SP1224)		P3				×	Erect shrub, to 0.4 m high. Clay, moist loam, clayey sand. Granite boulders.	Unlikely.
Ericaceae	*Andersonia gracilis*	Slender Andersonia	T	E	×			Slender erect or open straggly shrub, 0.1-0.5(-1) m high. Fl. white-pink-purple, Sep to Nov. White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	Possible.
Fabaceae	*Acacia anomala*	Grass Wattle	T	V	×	×	×	Slender, rush-like shrub, 0.2-0.5 m high. Fl. yellow, Aug to Sep. Lateritic soils. Slopes.	Unlikely.
Fabaceae	*Jacksonia sericea*	Waldjumi	P4			×	×	Low spreading shrub, to 0.6 m high. Fl. orange, usually Dec or Jan to Feb. Calcareous & sandy soils.	Possible.
Fabaceae	*Templetonia drummondii*		P4			×	×	Prostrate or ascending shrub, 0.1-0.4(-0.6) m high. Fl. yellow & brown/purple, Aug to Sep. Lateritic soils.	Unlikely.
Goodeniaceae	*Dampiera triloba*		P1			×	×	Erect perennial, herb or shrub, to 0.5 m high. Fl. blue, Aug to Dec. Dry grey soil, damp peaty sand, loamy sand. Hillside, coastal plain, sandy rise.	Possible.
Haemodoraceae	*Haemodorum loratum*		P3			×	×	Bulbaceous, perennial, herb, 0.45-1.2(-2) m high. Fl. black/brown-black/green, Nov. Grey or yellow sand, gravel.	Possible.
Haloragaceae	*Myriophyllum echinatum*		P3			×	×	Erect annual, herb, 0.02-0.03 m high. Fl. red, Nov. Clay. Winter-wet flats.	Unlikely.
Hydatellaceae	*Hydatella dioica* [now *Trithuria occidentalis*]	Swan Hydatella	T	E	×	×		Annual herb, leaves red. Fl. red, purple-red, Oct. Grey-brown clay. Low-lying depression, drying pools, muddy claypan.	Unlikely.
Malvaceae	*Lasiopetalum bracteatum*	Helena Velvet Bush	P4			×	×	Erect, open shrub, 0.4-1.5 m high. Fl. pink-purple, Aug to Nov. Sandy clay, clay, lateritic gravel. Along drainage lines, creeks, gullies, granite outcrops.	Possible.
Malvaceae	*Lasiopetalum pterocarpum*		T	E	×			Open, multi-stemmed shrub (with distinctly winged fruit), to 1.2 m high. Fl. pink, Aug to Dec. Dark red-brown loam or clayey sand over granite. On sloping banks near creeklines.	Unlikely.
Menyanthaceae	*Ornduffia submersa*		P4			×	×	Emergent aquatic herb. Fl. white/cream, Aug to Nov. Seasonal wetland. Yellow grey clayey sand, granite derived soil over limestone, moist brown clay.	Unlikely.
Menyanthaceae	*Villarsia calthifolia* [now *Ornduffia calthifolia*]	Mountain Villarsia	T	E		×		Upright tuberous rhizomatous herb 0.1—1.2 m. Fl. yellow, Oct to Jan, Apr. Granite slopes with brown sandy loam over granite.	Highly Unlikely.
Molluginaceae	*Macarthuria keigheryi*		T	E	×	×	×	Erect or spreading perennial, herb or shrub, 0.2-0.4 m high, 0.3-0.6 m wide. Fl. Sep to Dec or Feb to Mar. White or grey sand.	Possible.
Myrtaceae	*Calothamnus accedens*		P4			×	×	Erect & slender shrub, to 1.8 m high. Fl. pink-red. Sandy soils over laterite. Road verge.	Unlikely.

Flora likelihood of occurrence assessment for species potentially occurring within the Study Area

Family	Scientific name	Common name	Status		Source			Description and habitat requirements*	Likelihood of occurrence
			State	Federal	EPBC search	NatureMap Search	DEFL/WAHERB		
Myrtaceae	*Calytrix breviseta* subsp. *breviseta*		T	E	×			Shrub, 0.4-1 m high. Fl. purple-blue, Oct to Nov. Sandy clay. Swampy flats.	Unlikely.
Myrtaceae	*Chamelaucium* sp. Gingin (N.G.Marchant 6)		T	E	×			Erect open branching shrub, 1.5-2 m. Fl. white, white/pink, Sep to Dec. Dry white/grey, yellow sand, dry red-brown gravel. Slope, hilltop.	Unlikely.
Myrtaceae	*Darwinia apiculata*	Scarp Darwinia	T			×	×	Densely branched shrub, 0.4-0.5 m high. Fl. green & yellow/red, Oct. Lateritic soils.	Unlikely.
Myrtaceae	*Darwinia foetida*	Muchea Bell	T	CE	×			Erect, or spreading, shrub to 0.7 m high, often using other shrubs for support. Young branches are slender, green-brown with prominent, decurrent leaf bases, becoming grey and woody. Fl. green, Oct to Nov. Grey or white sand, swampy, seasonally wet sites.	Unlikely.
Myrtaceae	*Eucalyptus balanites*	Cadda Road Mallee	T	E	×			Mallee, to 5 m high, bark rough, flaky. Fl. white, Oct to Dec or Jan to Feb. Sandy soils with lateritic gravel.	Unlikely.
Myrtaceae	*Hypocalymma* sp. Cataby (G.J. Keighery 5151)		P2			×	×	Erect, spreading shrub, 0.5-1 m high, to 1 m wide. Fl. white, Aug. Grey sand.	Possible.
Myrtaceae	*Melaleuca viminalis*		P2			×	×	Slender, erect, weeping shrub, 1.5-3 m. Fl. red, Aug, Oct to Dec. Brown sandy clay, grey sand. Creekline, flat, drain.	Possible.
Myrtaceae	*Verticordia fimbrilepis* subsp. *fimbrilepis*		T	E		×		Shrub, 0.3-0.7 m high. Fl. pink-white, Oct to Dec or Jan. Gravelly sandy or clayey soils. Flats, road verges.	Possible.
Myrtaceae	*Verticordia lindleyi* subsp. *lindleyi*		P4			×	×	Erect shrub, 0.2-0.75 m high. Fl. pink, May or Nov to Dec or Jan. Sand, sandy clay. Winter-wet depressions.	Possible.
Orchidaceae	*Caladenia huegelii*	Grand Spider Orchid	T	E	×	×	×	Tuberous, perennial, herb, 0.25-0.6 m high. Fl. green & cream & red, Sep to Oct. Grey or brown sand, clay loam.	Possible.
Orchidaceae	*Epiblema grandiflorum* var. *cyaneum* [now *Epiblema grandiflorum*]	Babe-in-a-cradle		E	×			Tuberous herb, 0.3-0.65 m high, 0.03 m wide. Fl. purple, pale blue. Black peaty sand over clay, grey white peaty sand. Swamp, in shallow water.	Unlikely.
Orchidaceae	*Thelymitra magnifica*		P1			×	×	Perennial, herb. Stony ridges.	Unlikely.
Orchidaceae	*Thelymitra manginii* K.Dixon & Batty ms. [now *Thelymitra dedmaniarum*]	Cinnamon Sun Orchid	T	E	×			Tuberous, perennial, herb, to 0.8 m high. Fl. yellow, Nov to Dec or Jan. Granite.	Highly Unlikely.
Orchidaceae	*Thelymitra stellata*	Star Sun Orchid	T			×	×	Tuberous, perennial, herb, 0.15-0.25 m high. Fl. yellow & brown, Oct to Nov. Sand, gravel, lateritic loam.	Possible.
Proteaceae	*Banksia mimica*	Summer Honeypot	T	E	×	×	×	Prostrate, lignotuberous shrub, 0.15-0.4 m high. Fl. yellow-brown, Dec or Jan to Feb. White or grey sand over laterite, sandy loam.	Unlikely.
Proteaceae	*Banksia pteridifolia* subsp. *vernalis*		P3			×	×	Prostrate, lignotuberous shrub, to 0.4 m high. Fl. cream-white/yellow, Sep to Oct. White/grey sand over laterite.	Unlikely.
Proteaceae	*Conospermum undulatum*		T	V	×	×	×	Erect, compact shrub, 0.6-2 m high. Fl. white-other, May to Oct. Grey or yellow-orange clayey sand.	Recorded during the survey and previously.
Proteaceae	*Grevillea curviloba* subsp. *incurva*	Narrow curved-leaf Grevillea	T	E	×			Prostrate to erect shrub, 0.1-2.5 m high. Fl. white-cream, Aug to Sep. Sand, sandy loam. Winter-wet heath. Amongst low trees, or tall (sclerophyll) shrubland; in sand, or clay; occupying winter wet flats.	Possible.
Proteaceae	*Grevillea thelemanniana* subsp. *thelemanniana*	Spider Net Grevillea	P4			×		Widely spreading shrub 0.2-1.5 m high, 0.5-1.5 m wide. Fl. red, May-Nov. Moist grey-brown sandy loam over clay, yellow sand/grey clay soils. Edge of seasonal clay depression, on slightly deeper sandier soils, winter-wet, swampy area, flat.	Unlikely.
Proteaceae	*Isopogon drummondii*		P3			×	×	Erect, lignotuberous shrub, 0.4-1 m high. Fl. yellow/cream-yellow, Feb to Jun. White, grey or yellow sand, often over laterite.	Possible.
Proteaceae	*Synaphea* sp. Fairbridge Farm (D.Papenfus 696)	Selena's Synaphea	T	CE	×			Dense, clumped shrub, to 0.3 m high, to 0.4 m wide. Fl. yellow, Oct. Sandy with lateritic pebbles. Near winter-wet flats, in low woodland with weedy grasses.	Highly Unlikely.
Restionaceae	*Lepyrodia curvescens*		P2			×	×	Dioecious, shortly creeping, tufted rhizomatous, herb, 0.24-0.4 m high, rhizomes on surface or to 1 cm deep. Fl. Sep to Nov. Sand, laterite. Seasonally inundated swampland.	Possible.
Rutaceae	*Boronia humifusa*		T				×	Low-growing, wiry perennial, herb, 0.1-0.2 m high. Fl. pink/red, Jun or Sep. Gravelly clay loam over laterite. Jarrah-marri open forest.	Possible.
Stylidiaceae	*Stylidium longitubum*	Jumping Jacks	P3			×	×	Erect annual (ephemeral), herb, 0.05-0.12 m high. Fl. pink, Oct to Dec. Sandy clay, clay. Seasonal wetlands.	Unlikely.
Stylidiaceae	*Stylidium striatum*	Fan-leaved Triggerplant	P4			×	×	Rosetted perennial, herb, 0.15-0.55 m high, Leaves erect, oblanceolate to spathulate, 1.5-4 cm long, 1.5-6 mm wide, apex acute to acuminate, margin entire, glabrous, striate. Scape sparingly glandular on inflorescence axis, glabrous below. Inflorescence racemose. Fl. yellow, Oct to Nov. Brown clay loam over laterite. Hillslopes. Jarrah/Marri forest, Wandoo woodland.	Unlikely.

* WA Herbarium (1998-)
Conservation codes are provided in Appendix C

Appendix E — Fauna data

Fauna species recorded within the Study Area during the field surveys

Species Name	Conservation Code	GHD November 2012 survey	GHD, 2013 survey (all surveys combined)
Morethia obscura	-	-	X
*Cryptoblepharus buchananii (*Wall skink)	-	-	X
*Crinia insignifera (*Sign-bearing froglet*)*	-	-	X
Acanthagenys rufogularis (Spiny-cheeked Honeyeater)	-	X	X
Acanthiza inornata (Western Thornbill)	-	X	X
Acanthorhynchus superciliosus (Western Spinebill)	-	X	X
Accipiter cirrocephalus (Collared Sparrowhawk)	-	X	X
Acridotheres tristis (Common Myna)	-	X	X
Anas gracilis (Grey Teal)	-	X	X
Anas superciliosa (Pacific Black Duck)	-	X	X
Anthochaera carunculata (Red Wattlebird)	-	X	X
Ardea novaehollandiae (White-faced Heron)	-	X	X
Artamus cinereus (Black-faced Woodswallow)	-	X	X
Cacatua galerita (Sulphur-crested Cockatoo)	-	X	X
Cacatua sanguinea (Little Corella)	-	X	X
Chenonetta jubata (Australian Wood Duck)	-	X	X
Colluricincla harmonica (Grey Shrike-thrush)	-	X	X
Coracina novaehollandiae (Black-faced Cuckoo-shrike)	-	X	X
Corvus coronoides (Australian Raven)	-	X	X
Cracticus nigrogularis (Pied Butcherbird)	-	X	X
Cracticus tibicen (Australian Magpie)	-	X	X
Cygnus atratus (Black Swan)	-	X	X
Dacelo novaeguineae (Laughing Kookaburra)	-	X	X
Falco cenchroides (Australian Kestrel)	-	X	X
Falco longipennis (Australian Hobby)	-	X	X
Fulica atra (Eurasian Coot)	-	X	X
Gallinula tenebrosa (Dusky Moorhen)	-	X	X
Glossopsitta sp. (Lorikeet)	-	X	X
Grallina cyanoleuca (Magpie-lark)	-	X	X
Malurus splendens (Splendid Fairy-wren)	-	X	X
Pardalotus striatus (Striated Pardalote)	-	X	X
Phalacrocorax carbo (Great Cormorant)	-	X	X
Phylidonyris novaehollandiae (New Holland Honeyeater)	-	X	X
Platycercus zonarius subsp. semitorquatus (Twenty-eight Parrot)	-	X	X
Rhipidura leucophrys (Willie Wagtail)	-	X	X
Threskiornis molucca (Australian White Ibis)	-	X	X
Todiramphus sanctus (Sacred Kingfisher)	-	X	X

Calyptorhynchus latirostris (Carnaby's Cockatoo (short-billed black-cockatoo))	T, V	X	X
Calyptorhynchus banksii subsp. *naso* (Forest Red-tailed Black-Cockatoo)	T, E	-	X
*Calyptorhynchus sp.(*unidentified black cockatoo*)*	T, V or E	-	X
*Macropus fuliginosus (*Western Grey Kangaroo*)*	-	X	X
Trichosurus vulpecula subsp. vulpecula (Common Brushtail Possum)	-	X	X
Isoodon obesulus subsp. *fusciventer* (Quenda)	P4	X	X
*Oryctolagus cuniculus (*Rabbit*)**	-	X	X

V Vulnerable E Endangered (EPBC Act), T Threatened (WC Act). * introduced/exotic

Likelihood of occurrence – fauna of conservation significance

Species Name	Status	Source		Likelihood of occurrence within Study Area (SA)
		WC Act/ DPaW	EPBC	
Reptiles				
Lerista lineata Perth-lined Skink	*	P3	-	L – species inhabits swan coastal plain south of the Swan River, including banksia eucalypt woodlands and suburban gardens which are present within the SA. This species was not recorded within the Study Area. However, given the cryptic nature of this species it is still considered likely that it could occur within the woodland habitats of the Study Area south of the river.
Neelaps calonotos Black-striped Snake	1	P3	-	UL – habitat (banksia/eucalypt woodlands) within SA considered marginal, and modified.
Pseudemydura umbrina Western Swamp Turtle	1	T	-	VU – habitat for this species (ephemeral swamps) not recorded within SA. Only known from two swamps near Bullsbrook. Habitat within SA considered marginal, and modified.
Morelia spilota subsp. *imbricata* Carpet Python	1	S	-	UL – habitat for this species within the SA (woodland, and riparian) is restricted and modified.
Birds				
Calidris ferruginea Curlew Sandpiper	1	IA	MM	UL – habitat suitable for this species (mainly occur on intertidal mudflats in sheltered coastal areas) is restricted to areas of exposed mud along Swan River margins, within SA near existing Swan River crossing. Possible occasional visitor.
Calidris ruficollis Red-necked Stint	1	IA	MM	UL – habitat suitable for this species (mainly occur in sheltered coastal areas) is restricted to areas of exposed mud along Swan River margins, within SA near existing Swan River crossing. Possible occasional non-breeding visitor.
Actitis hypoleucos Common Sandpiper	1	IA	MM	UL – habitat suitable for this species is restricted to areas of exposed mud along Swan River margins, within SA near existing Swan River crossing. Possible occasional visitor.
Tringa glareola Wood Sandpiper	1	IA	MM/MT	UL – habitat suitable for species (well-vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes) not recorded within SA. Does not breed in Australia.
Tringa nebularia Common Greenshank	1	IA	MM	UL – habitat suitable for species (inland wetlands and sheltered wetland coastal habitats of varying salinity) not recorded within SA. Does not breed in Australia.
Anous tenuirostris subsp. *melanops* Australian Lesser Noddy	1	T	V	VU – habitat suitable for this species (coral limestone islands, mangroves, and sandy/shingle beaches) not recorded with SA.
Apus pacificus Fork-tailed Swift	1	IA	MM	UL – species almost exclusively aerial and does not breed within Australia. Possible occasional visitor.
Ardea alba subsp. *modesta* Eastern Great Egret	1	IA	MM, MW	UL – habitat suitable for this species is limited to foraging habitat along the Swan River margins along existing Swan River crossing. Possible occasional visitor.
Ardea ibis Cattle Egret	1	IA	MM, MW	UL – habitat suitable for this species is limited to foraging habitat along the Swan River margins and adjacent riparian zone, near existing Swan River crossing. Possible occasional visitor.
Burhinus grallarius Bush Stone-curlew	1	P4	-	VU – habitat for this species (large tracts of open woodland, with woody debris) marginal within SA.
Cacatua pastinator subsp. *pastinator* Muir's Corella (Western Corella SW WA)	1	T	V	UL – species distribution is generally restricted to the extreme south-west of WA. Possible occasional visitor to remnant woodlands of SA.
Calyptorhynchus banksii subsp. *naso* Forest Red-tailed Black-Cockatoo	1,2	T	E	***Recorded on site during current survey*** – A female and juvenile Forest Red-tailed Black-Cockatoo were observed foraging within the vegetation of Poison Gully Creek (High Wycombe area) during the most recent surveys (September 2013). Suitable foraging, night roosting and potential breeding hollows were also recorded within the habitat along Poison Gully Creek. Habitat for this species for the remainder of the SA is restricted to small linear patches of remnant woodland and riparian woodland habitat. May occasionally visit these habitat for foraging.
Calyptorhynchus baudinii Baudin's Cockatoo (long-billed black-cockatoo)	1,2	T	V	UL – habitat for this species restricted to small linear patches of remnant woodland and riparian woodland habitat. May occasionally visit the SA for foraging.

Species Name	Status	Source		Likelihood of occurrence within Study Area (SA)
		WC Act/ DPaW	EPBC	
Calyptorhynchus latirostris Carnaby's Cockatoo (short-billed black-cockatoo)	1,2	T	V	***Recorded on site during survey*** – Two Carnaby's Black Cockatoos were observed flying over the site on one occasion, south along the Tonkin Highway (November 2012).During the same survey four other unidentified black cockatoos were observed flying north along the edge of the Swan River. A small flock of Carnaby's Black Cockatoo was recorded flying north-south over the High Wycombe area and was observed alighting in a stand of Marri in the southern portion of the site. A separate small flock of unidentified Black Cockatoo (Calyptorhynchus sp.) was also heard flying over north-east later in the afternoon during the same survey (August 2013). Habitat for this species for the remainder of the SA is restricted to small linear patches of remnant woodland and riparian woodland habitat. May occasionally visit these habitat for foraging.
Haliaeetus leucogaster White-bellied Sea-eagle	2	-	MT	UL – habitat within SA restricted to riparian vegetation and the river. May be an occasional visitor to the SA.
Botaurus poiciloptilus Australasian Bittern	1	T	E	VU – habitat for this species (densely vegetated freshwater wetlands and, rarely, in estuaries or tidal wetlands) not recorded within SA.
Ixobrychus flavicollis subsp. *australis* Australian Black Bittern	1	P3	-	VU – habitat for this species (mangroves, stream side vegetation) limited to narrow sections of riparian habitat along margins of Swan River.
Ixobrychus minutus subsp. *dubius* Australian Little Bittern	1	P4	-	VU – habitat for this species (reed beds, dense vegetation of freshwater swamps and creeks) not recorded within SA.
Leipoa ocellata Mallee Fowl	1,2	T	V, MT	VU – The Malleefowl usually occurs in shrublands and low woodlands that are dominated by mallee vegetation. There is no suitable habitat present within the SA.
Macropus irma Western Brush Wallaby	1	P4	-	VU - habitat for this species (larger tracts of continuous woodland/forest) not recorded within SA. The SA is not connected to other areas of large continuous vegetation.
Merops ornatus Rainbow Bee-eater	1,2	IA	MT	L – suitable habitat in the form of woodlands is in the SA, particularly given all sites are in close proximity to water. Most likely a seasonal visitor to the Swan River and riparian vegetation of the SA.
Rostratula australis Australian Painted Snipe	2	T	V, MW	UL – habitat for this species (shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans) restricted to margins of the Swan River and riparian vegetation. Possible very occasional visitor to SA.
Sterna nereis subsp. *nereis* Fairy Tern	1,2	T	V	UL – habitat for this species (nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation, roost on beaches) was not recorded within the SA.
Falco peregrinus Peregrine Falcon	1	S	-	L – suitable foraging and temporary roosting habitat recorded within woodland habitats and along river. Species likely to be a regular visitor to SA.
Mammals				
Myrmecobius fasciatus Numbat	1	T	E	VU – habitat for this species was not recorded within the SA.
Dasyurus geoffroii Chuditch	1,2	T	V	VU – habitat for this species is very marginal and restricted to the small linear patches of woodland. The SA is not connected to other areas of large continuous vegetation.
Hydromys chrysogaster Water-rat	1	P4	-	L – Swan River and riparian vegetation provides suitable habitat. Species likely to occupy a broader are than the river section intercepted by the Project. Species also likely to occur within Poison Gully Creek.
Isoodon obesulus subsp. *fusciventer* Quenda	1	P4	-	***Recorded within woodland habitat during the survey***. Known from previous records within Study Area. This species was recorded on several occasions in habitat north of the Tonkin Highway and south of Stanton Road, within the Perth Airport land and the High Wycombe area. A Quenda was recorded foraging beneath a thicket of the introduced Victorian tea tree in the southern portion of the High Wycombe site, and Quenda diggings/scratching were recorded in multiple locations in the southern portion of the site
Phascogale calura Red-tailed Phascogale	2	T	E	VU – habitat for this species is very marginal (preferred habitats are Allocasuarina woodlands with hollow-containing eucalypts (e.g. Eucalyptus wandoo) and Gastrolobium spp.) and restricted to the riparian woodland of the SA. The SA is not connected to other areas of large continuous vegetation. Furthermore, the species has not been recorded on the Swan Coastal Plain in the vicinity of the SA and is now restricted to woodlands ain the Wheatbelt of Western Australia.
Phascogale tapoatafa subsp. *tapoatafa* Southern Brush-tailed Phascogale	1	T	-	UL – habitat for this species is very marginal and restricted to the small linear patches of woodland. The SA is not connected to other areas of large continuous vegetation.
Setonix brachyyurus Quokka	2	T	V	VU – habitat for this species was not recorded within the SA.
Insects				

Species Name	Status	Source		Likelihood of occurrence within Study Area (SA)
		WC Act/ DPaW	EPBC	
Synemon gratiosa Graceful Sun Moth	2	P4	-	L – habitat for this species within this part of the Swan Coastal Plain (*Banksia* woodland on Spearwood and Bassendean dunes, where the second known host plant *Lomandra hermaphrodita* is widespread) was marginal. *Lomandra* sp. was recorded but was uncommon and scattered, and associated with modified areas. There is a low possibility that this species would be a resident within the low open woodland habitats of the SA.

Key to table:

Source

1 = DPaW NatureBase – record(s) from within 5 km of the Study Area.

2 = EPBC Act Protected Matters Search Tool (PMST).

* species not recorded from database search. Species considered as the documented range (Van Dyke and Strahan, 2008 or Bush et al., 2012) and habitat overlaps with the Study Area.

Likelihood

KNOWN – species has historical record(s) from within the Study Area from NatureBase.

L = LIKELY – potentially suitable habitat occurs within Study Area. Species recorded historically within 5 km of the area and species' known range encompasses the area, but species not detected within area during surveys;

UN = UNLIKELY – species' known range encompasses the Study Area, but suitable habitat does not occur within area, or potentially suitable habitat occurs within area but habitat quality and quantity is generally poor or restricted; and

VU = VERY UNLIKELY – no historical records of the species within 5 km of the Study Area and suitable habitat within area is absent or very restricted.

No category exists for species' absence.

Conservation categories

E Endangered (EPBC Act)

V Vulnerable (EPBC Act)

MT Migratory terrestrial species (EPBC Act)

MW Migratory wetland species (EPBC Act)

MM Migratory marine species (EPBC Act)

T Threatened (WC Act)

S Other specially protected fauna (WC Act)

P Priority (DPaW)

IA International Agreement

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